Biomanufacturing Project Management Advanced Certificate Proposal

Documents Include:

- BPM certificate SUNY Form 2C_2-4-2025 Final
- BME 500 Bioprocess and Biomanufacturing V5
- BME 510 Biomole Eng for Biomanufacturing V5
- BME 521 Biomanufacturing for Green Chemistry V5
- BME 530 Sustainable Bioprocess Design_Scale-up V5
- BME 540 AI and Biomanufacturing Data and Statistical Analysis V5
- BME 550 Biomanufacturing Project Managment Capstone Design V5
- PM 500 Fundamentals of Project Management V5
- PM 510 Leadership Skills in a Digital World V5
- PM 520 Management of Strategic Human Capital V5
- PM 530 Data Science for Project Management V5
- PM 540 Introduction to Product Management V5
- PM 550 Creativity Process Innovation Implementation V5
- BPM certificate SUNY Form 2E Final
- BPM certificate SUNY Form 4_10-28-2024 Final
- Diversity-rubric-for-proposals Final

New Program Proposal:
Certificate or Advanced Certificate Program

Form 2C

Version 2016-10-13

This form should be used to seek SUNY's approval and New York State Education Department's (SED) registration of a proposed new academic program leading to a certificate or an advanced certificate. Approval and registration are both required before a proposed program can be promoted or advertised, or can enroll students. The campus Chief Executive or Chief Academic Officer should send a signed cover letter and this completed form (unless a different form applies[1]), which should include appended items that may be required for Sections 1 through 5 and 10 of this form, to the SUNY Provost at *program.review@suny.edu*. The completed form and appended items should be sent as a single, continuously paginated document.[2] If Sections 7 and 8 of this form apply, External Evaluation Reports and a single Institutional Response should also be sent, but in a separate electronic document. Guidance on academic program planning is available here.

Table of Contents

NOTE: Please update this Table of Contents automatically after the form has been completed. *To do this, put the cursor anywhere over the Table of Contents, right click, and, on the pop-up menus, select "Update Field" and then "Update Page Numbers Only." The last item in the Table of Contents is the List of Appended and/or Accompanying Items, but the actual appended items should continue the pagination.*

[1]Use a different form if the proposed new program will lead to a graduate degree or any credit-bearing certificate; be a combination of existing registered programs (i.e. for a multi-award or multi-institution program); be a breakout of a registered track or option in an existing registered program; or **lead to certification as a classroom teacher, school or district leader, or pupil personnel services professional** (e.g., school counselor).

[2]This email address limits attachments to 25 MB. If a file with the proposal and appended materials exceeds that limit, it should be emailed in parts.

Section 1. General Information		
a) Institutional Information	Date of Proposal:	January 28, 2025
	Institution's 6-digit SED Code:	**211000**
	Institution's Name:	Binghamton University (State University of New York at Binghamton)
	Address:	4400 Vestal Parkway East, Binghamton, NY 13901
	Dept of Labor/Regent's Region:	Southern Tier
b) Program Locations	List each campus where the entire program will be offered (with each institutional or branch campus 6-digit SED Code): Binghamton University, 211000	
	List the name and address of off-campus locations (i.e., extension sites or extension centers) where courses will offered, **or check here [X] if not applicable**:	
c) Proposed Program Information	Program Title:	Biomanufacturing Project Management
	Award(s) (e.g., Certificate.):	Advanced Certificate
	Number of Required Credits:	Minimum [16] If tracks or options, largest minimum [ ]
	Proposed HEGIS Code:	0905.00
	Proposed 6-digit CIP 2020 Code:	14.0501
	If the program will be accredited, list the accrediting agency and expected date of accreditation:	
	If applicable, list the SED professional licensure title(s)[3] to which the program leads:	
d) Campus Contact	Name and title: Terrance Deak, Vice Provost and Dean of the Graduate School Telephone:607-777-2071 E-mail: tdeak@binghamton.edu	
e) Chief Executive or Chief Academic Officer Approval	**Signature affirms that the proposal has met all applicable campus administrative and shared governance procedures for consultation, and the institution's commitment to support the proposed program.** ***E-signatures are acceptable.*** Name and title: Donald E. Hall, Provost and Executive Vice President for Academic Affairs Signature and date:	
	If the program will be registered jointly[4] with one or more other institutions, provide the following information for <u>each</u> institution:	
	Partner institution's name and 6-digit SED Code: Name, title, and signature of partner institution's CEO (or **append** a signed letter indicating approval of this proposal):	

[3] If the proposed program leads to a professional license, a specialized form for the specific profession may need to accompany this proposal.
[4] If the partner institution is non-degree-granting, see SED's CEO Memo 94-04.

Section 2. Program Information

2.1. Program Format

Check all SED-defined formats, mode and other program features that apply to the **entire program**.

a) Format(s): [X]Day [X]Evening [X]Weekend [X]Evening/Weekend [X]Not Full-Time

b) Modes: [ ]Standard [ ]Independent Study [ ]External [ ]Accelerated [X]Distance Education
NOTE: *If the program is designed to enable students to complete 50% or more of the course requirements through distance education, check Distance Education, see Section 10, and* ***append*** *a Distance Education Format Proposal*

c) Other: [ ] Bilingual [ ] Language Other Than English [ ] Upper Division [ ] Cooperative [ ] 4.5 year [ ] 5 year

2.2. Related Degree Programs

All coursework required for completion of the certificate or advanced certificate program must be applicable to a currently registered degree program at the institution (with the possible exception of post-doctoral certificates in health-related fields). Indicate the registered degree program(s) by title, award and five-digit SED Inventory of Registered Programs (IRP) code to which the credits will apply:

Title	Award	SED Code
BIOMEDICAL ENGINEERING	MS	32188
BIOMEDICAL ENGINEERING	MS	37255
BUSINESS ADMIN	MBA	43083
BUSINESS ADMIN	MBA	82361
BUSINESS ADMIN	MBA	82362
BUSINESS ADMIN	MBA	82365
BUSINESS ADMIN	MBA	82366
BUSINESS ADMIN	MBA	82367
BUSINESS ADMINISTRATION	MBA	82368
BUSINESS ADMINISTRATION	MBA	82370
BUSINESS ADMINISTRATION	MBA	82371
BUSINESS ADMINISTRATION	MBA	82375
BUSINESS ADMINISTRATION	MBA	82376
BUSINESS ADMINISTRATION	MBA	82377
BUSINESS ADMINISTRATION	MBA	82378
BUSINESS ADMINISTRATION	MBA	82379
BUSINESS ADMINISTRATION	MBA	82380
BUSINESS ADMINISTRATION	MBA	82381
BUSINESS ADMINISTRATION	MBA	82382
BUSINESS ADMINISTRATION	MBA	82385
BUSINESS ADMINISTRATION	MBA	82386
BUSINESS ADMINISTRATION	MBA	82387
BUSINESS ADMINISTRATION	MBA	82364
BUSINESS ADMINISTRATION	MBA	43248
BUSINESS ADMINISTRATION	MBA	43416
BUSINESS ADMINISTRATION	MBA	43925

Title	Award	SED Code
BUSINESS ADMINISTRATION	MBA	20587
BUSINESS ADMINISTRATION	MBA	28328
BUSINESS ADMINISTRATION	MBA	28329
BUSINESS ADMINISTRATION	MBA	28330
BUSINESS ADMINISTRATION	MBA	28331
BUSINESS ADMINISTRATION	MBA	29290
BUSINESS ADMINISTRATION	MBA	29303
BUSINESS ADMINISTRATION	MBA	03092
BUSINESS ADMINISTRATION	MBA	20586
BUSINESS ADMINISTRATION	MBA	82388
BUSINESS ADMINISTRATION	MBA	82389
BUSINESS ADMINISTRATION	MBA	82390
BUSINESS ADMINISTRATION	MBA	82391
BUSINESS ADMINISTRATION	MBA	82392
BUSINESS ADMINISTRATION	MBA	82393
BUSINESS ADMINISTRATION	MBA	82394
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BUSINESS ADMINISTRATION	MBA	82396
BUSINESS ADMINISTRATION	MBA	82397
BUSINESS ADMINISTRATION	MBA	82398
BUSINESS ADMINISTRATION	MBA	82399
BUSINESS ADMINISTRATION	MBA	82400
BUSINESS ADMINISTRATION	MBA	82403
BUSINESS ADMINISTRATION	MBA	82406
BUSINESS ADMINISTRATION	MBA	82407
BUSINESS ADMINISTRATION	MBA	82408
BUSINESS ADMINISTRATION	MBA	82409
BUSINESS ADMINISTRATION	MBA	82410
BUSINESS ADMINISTRATION	MBA	82411
BUSINESS ADMINISTRATION	MBA	82412
BUSINESS ADMINISTRATION	MBA	82413
BUSINESS ADMINISTRATION	MBA	82414
BUSINESS ADMINISTRATION	MBA	82416
BUSINESS ADMINISTRATION	MBA	82417
EXECUTIVE BUS. ADMINISTRATION	MBA	20420
FAST-TRACK PROFESSIONAL MBA (NYC)	MBA	31945

2.3. Program Description, Purposes and Planning

What is the description of the program as it will appear in the institution's catalog?

Effective project management (PM) is crucial for guiding diverse teams and fostering innovation in biomanufacturing. This biomanufacturing project management (BPM) advanced certificate program integrates biomanufacturing and project management training into one program to prepare a resilient workforce capable of adapting to biomanufacturing's ever-changing landscape. The advanced certificate program will be 24 weeks in duration, offered asynchronously online and optional one-week on-site training. It comprises core courses and electives, including

industry-informed team projects focused on green chemistry biomanufacturing. This new training paradigm will grow the essential workforce for biomanufacturing by removing the many barriers facing workers—particularly those from underrepresented groups who pursue these careers.

What are the program's educational and, if appropriate, career objectives, and the program's primary student learning outcomes (SLOs)? *NOTE: SLOs are defined by the Middle States Commission on Higher Education in the Characteristics of Excellence in Higher Education (2006) as "clearly articulated written statements, expressed in observable terms, of key learning outcomes: the knowledge, skills and competencies that students are expected to exhibit upon completion of the program."*

The program's educational objectives are to prepare a resilient workforce capable of adapting to biomanufacturing's ever-changing bioindustry landscape, to equip students with a wide range of skills that will benefit them in their long-term career development, and finally to provide industry with a skilled workforce and the potential leaders to help the biomanufacturing industry grow over the long term.

Primary Student Learning Outcomes (SLOs): after completing the program, students will be able to

- Identify, formulate, and solve complex biomanufacturing and project management problems by applying principles of biomanufacturing engineering and project management science (SLO1)

- Collaborate effectively on a team (SLO2)

- Acquire and apply new knowledge through life-long learning strategies (SLO3)

We have formulated these SLOs by following similar ones adopted by the Accreditation Board for Engineering and Technology (ABET). ABET guides all engineering programs; accreditation by ABET is necessary to offer an engineering degree program to students.

How does the program relate to the institution's and SUNY's mission and strategic goals and priorities? What is the program's importance to the institution, and its relationship to existing and/or projected programs and its expected impact on them? As applicable, how does the program reflect diversity and/or international perspectives?

Binghamton University has recognized the importance of workforce training and has recently established an Office of Workforce Development within the Provost's Office. Biomanufacturing workforce training is also part of the SUNY priorities reflected in the recent SUNY STRIVE Biotech and Biomanufacturing Task Force Report. The recent White House Bioeconomy Executive Order calls for national efforts to enforce biotech and biomanufacturing workforce training. It calls for developing new workforce training paradigms that will grow this essential workforce by providing the wide range of skills needed for many bioeconomy occupations and removing the many barriers facing students and workers—particularly those from underrepresented groups who pursue these careers.

In response to these calls, Binghamton University has developed a joint biomanufacturing workforce training program, which will be offered in the format of an advanced certificate program, to be offered by Thomas J. Watson College of Engineering and Applied Science and the School of Management. This advanced certificate program is currently funded by the Air Force Defense Research Sciences Program through BioMADE—an Air Force funded Advanced Biomanufacturing Institute. The program integrates biomanufacturing training and project management training into one program, allowing students to learn and master the knowledge and skills required for both biomanufacturing and management. These trainings will be accomplished through a modularized, 24-week, advanced certificate program designed to offer both professional and career development training. This new workforce training paradigm is based on best practices that reflect lessons learned from our National Science Foundation (NSF) Research Experience for Undergraduate (REU), National Institute of Standards and Technology (NIST) postdoctoral, graduate training programs, our multi-institution partnerships with minority-serving institutions (Thurgood Marshall HBCU-Watson College Research and Education Alliance) as well as our collaboration with Lockheed Martin, Lygos, National Corn-to-Ethanol Research Center, and Invizyne Technologies on workforce training. It is also built upon many years of experience gained from workforce training at institutional and individual faculty levels. It offers theory-to-practice training by empowering the students with knowledge, skills, and practical experience to succeed in biomanufacturing. It will grow the essential workforce for biomanufacturing by removing the many barriers facing workers—particularly those from underrepresented groups who pursue these careers.

How were faculty involved in the program's design?

Faculty from the Department of Biomedical Engineering in the Thomas J. Watson College of Engineering and Applied Science and the School of Management have been fully-engaged in developing this joint program. The primary faculty working to design the program are:

Kaiming Ye, SUNY Distinguished Professor, Chair of Biomedical Engineering Department, and Director, Center of Biomanufacturing for Regenerative Medicine

Shelley Dionne, Professor and Dean, School of Management

Sha Jin, Professor and Director of Undergraduate Program, Department of Biomedical Engineering

Cho-Yu Tsai, Associate Professor and Associate Director, Bernard M. Ruth Bass Center for Leadership Studies, PhD Program Coordinator

They have been working together to conceptualize and design this advanced certificate program. Faculty from both the Department of Biomedical Engineering and School of Management, including Associate Professor Tracy Hookway, Professor Gretchen Mahler, and Assistant Professor Siyuan Rao have also contributed to the design of this program. This program creates an efficient and collaborative ecosystem that brings together key faculty, workforce training developers, industry partners, and academic leaders to advance biomanufacturing workforce training.

How did input, if any, from external partners (e.g., educational institutions and employers) or standards influence the program's design? If the program is designed to meet specialized accreditation or other external standards, such as the educational requirements in Commissioner's Regulations for the Profession, append a side-by-side chart to show how the program's components meet those external standards. If SED's Office of the Professions requires a specialized form for the profession to which the proposed program leads, append a completed form at the end of this document.

We have received extensive inputs from our industry partners, including Lockheed Martin, Lygos, National Corn-to-Ethanol Research Center, and Invizyne Technologies, and the BioMADE Education and Workforce Development Team. BioMADE funded the design and development of this advanced certificate program, and we have been working with them on curriculum design, student learning outcomes, capstone design, optional one-week on-site training, and an internship program. We have incorporated their inputs into the program. Our industry partners will offer an optional one-week on-site training to the students at their biomanufacturing site. They will also serve as mentors for students' capstone design course in the last 8 weeks of the program.

Enter anticipated enrollments for Years 1 through 5 in the table below. How were they determined, and what assumptions were used? What contingencies exist if anticipated enrollments are not achieved?

Year	Anticipated Headcount Enrollment			Estimated FTE
	Full-time	Part-time	Total	
1	25	N/A	25	25
2	30	N/A	30	30
3	35	N/A	35	35
4	40	N/A	40	40
5	50	N/A	50	50

This is a 24-week advanced certificate program. We aim to foster a diverse and skilled network of workers who can meet the growing demands in biomanufacturing. This recruiting strategy is built upon our success with NSF REU sites (90% of trainees were from underrepresented populations) and our HBCU-Thurgood Marshall-Watson College Alliance. Binghamton University's Thomas J. Watson College of Engineering and Applied Science has recently formed an education and research alliance with six historically black colleges and universities, including Alabama A&M University, Central State University, Tuskegee University, Prairie-View A&M University, the University of the District of Columbia, and Virginia State University. The alliance offers stable student pipelines for the program. Collaboration with our industry partners will further broaden the pool of potential students. The BioMADE

Workforce Training Network offers additional resources for recruiting. Harnessing these excellent track records and networks, we have developed the following strategy for recruiting and retaining students:

Recruitment. We will collaborate with Watson's Office of Industrial Outreach that offers continuous education courses and BioMADE to promote our program. Our program website will showcase the program's curriculum, career development opportunities, and professional training programs. We will send program invitations via email, social media, and faculty contacts. We will host online workshops to assist students in gaining knowledge about and applying to the program. We will create pipelines with targeted institutions and use email listservs and professional societies to recruit URM students. We will organize recruiting events at sites of our industry partners and work with BioMADE to bring diversified trainees to the program.

Selection. Prospective students will apply online by submitting an application, resume, and a personal statement that addresses their reasons for applying, future educational and career plans, and relevant experience. Prospective students will be provided with information about the advanced certificate program including course instructors, available capstone projects, optional on-site training, and internship, as well as career and professional development opportunities. A review and selection committee consisting of PI and co-PIs and representatives from our industry partners will review the applications along with an initial screening call with potential students. Admitted students will receive detailed information about the curriculum and program activities.

Retention. We understand the problems students face during their studies and want to ensure that they progress from admission to program completion. We will create a progress check form to monitor their course study, and instructors will review it bi-monthly to address any issues. The Program Director will intervene if necessary. The capstone design project will keep students on track towards graduation.

Outline all curricular requirements for the proposed program, including prerequisite, core, specialization (track, concentration), capstone, and any other relevant component requirements, but do not list each General Education course.

Core Courses (10 credits):

Course Title	Credits	Prerequisite(s)
BME 500 Bioprocess and Biomanufacturing	2	
BME 510 Biomolecular Engineering for Biomanufacturing	2	BME 500
BME 550 Biomanufacturing Project Management Capstone Design	2	BME 500, BME 510, PM 500, and PM 510
PM 500 Fundamentals of Project Management	2	
PM 510 Leadership Skills in a Digital World	2	PM 500

Elective Courses: Must choose one BME elective and two PM electives (6 credits):

Course Title	Credits	Prerequisite(s)
BME 521 Biomanufacturing for Green Chemistry	2	BME 500
BME 530 Sustainable Bioprocess Design and Scale-up	2	BME 500 and BME 510
BME 540 AI and Biomanufacturing Data and Statistical Analysis	2	BME 500 and BME 510
PM 520 Management of Strategic Human Capital or PM 530 Data Science for Project Management	2	PM 500 and PM 510 PM 500 and PM 510
PM 540 Introduction to Product Management or PM 550 Creativity Process & Innovation Implementation	2	PM 500 PM 510

Program Impact on SUNY and New York State

h)(1) ***Need:*** What is the need for the proposed program in terms of the clientele it will serve and the educational and/or economic needs of the area and New York State? How was need determined? Why are similar programs, if any, not meeting the need?

New York State is a home for technology innovation and entrepreneurship in biomanufacturing, including companies such as Regeneron, Pfizer, Merck (New Jersey), Johnson & Johnson, GE, Thermo Fisher, Corning, Lonza (Maryland), Epibone, Universal Instruments, the NY Stem Cell Foundation, and the Neural Stem Cell Institute. To sustain and expand these industries, we need to build a well-trained and skilled workforce. As stated above, this advanced certificate program integrates biomanufacturing skill training with project management training so that the students will be better prepared for a high-salaried and high-skilled job in the biomanufacturing sectors. The team has been working with BioMADE, an Air Force-funded Advanced Biomanufacturing Institute that has more than 270 industrial memberships, to develop a National Biomanufacturing Workforce Training Hub. The program is designed to offer forward-looking, evidence-based workforce training that will foster the next generation of leaders in biomanufacturing, allowing students to learn and master the knowledge and skills required for both biomanufacturing and management. These trainings will be accomplished through a modularized, 24-week, advanced certificate program designed to offer both professional and career development training. It is designed for students, veterans, entry-level workers, or those reentering the bioindustry workforce. It will grow and sustain a diverse, highly-skilled workforce capable of meeting biomanufacturing needs within the state and, more broadly, the national bioeconomy. The major objectives of the advanced certificate program include: 1) Improving project management proficiency among participants over a 24-week timeframe by implementing specialized training modules, and 2) Increasing diversity in the biomanufacturing workforce by recruiting and retaining underrepresented groups, aiming for a 20% rise in representation of participants within three years. This advanced certificate program will spur the development and expansion of bioindustries that will create thousands of new high-salaried jobs and stimulate a new round of economic growth in the state.

The biomanufacturing sector is going through a remarkable transformation driven by technological advancements, concerns for environmental sustainability, and a rising demand for bio-based products. These advances will not succeed without a highly-skilled and diverse workforce in biotechnology and biomanufacturing, as noted by the Office of Science and Technology's recent report on bio-workforce training. The advances in biotechnology, such as green bioprocessing, synthetic microorganism design for green chemistry, machine-learning-based AI bioprocessing, and precision fermentation, require a workforce adept in biomanufacturing with an understanding of advanced biomanufacturing technologies. The push to reduce carbon footprints and enhance sustainability calls for skilled professionals who can design and execute sustainable practices, waste reduction techniques, and the circular economy. As a result, there is a growing need for a specialized workforce that possesses not only technical skills relevant to biomanufacturing processes but also strong project management, leadership, and social skills to navigate the complexities of the industry.

The complexity of bioprocesses necessitates strong project management and leadership skills. Professionals in this field must be capable of leading multidisciplinary teams, managing budgets, and steering projects from conception to completion. Furthermore, the collaborative nature of biomanufacturing, involving stakeholders from diverse backgrounds, underscores the importance of practicing effective social skills, such as communication, negotiation, and teamwork. Currently, there is a gap in the training of the bio-workforce, as most training focuses on developing technical skills rather than project management, leadership, and social skills. While hands-on technical training is essential and should be increased, the lack of strong social training limits the long-term development of students and employees. It also hurts the retention of underrepresented groups due to poorly-trained managers and co-workers since there is a lack of social belonging and impactful mentorship.

Traditional trainings in biomanufacturing and management are “artificially” separated and performed in parallel. Workers who receive training in biomanufacturing lack knowledge and skills in project management. In contrast, those who go through project management training have no knowledge about biomanufacturing unless they have prior working experience in the bioindustry, which is hard to achieve for students, veterans, entry-level workers, and those reentering the workforce.

Unlike traditional educational courses, this advanced certificate program takes a strategic approach to training by combining technical skills, hands-on research and development experience, social skills training, program management training, and leadership training. This approach equips students with a wide range of skills that will benefit them in their long-term career development. It will also provide industry with a skilled technical workforce and the potential leaders to help the biomanufacturing industry grow over the long term. The spiral

training model offers students multilayer training opportunities to practice what they learn from coursework to be better equipped for solving real-world problems.

h)(2) ***Employment:*** For programs designed to prepare graduates for immediate employment, use the table below to list potential employers of graduates that have requested establishment of the program and describe their specific employment needs. If letters from employers support the program, they may be **appended** at the end of this form. As appropriate, address how the program will respond to evolving federal policy on the "gainful employment" of graduates of certificate programs whose students are eligible for federal student assistance.

Employer	*Need: Projected positions*	
	In initial year	**In fifth year**
Lockheed Martin	2 (skills in coordination and project management)	10
National Corn-to-Ethanol Research Center	2 (knowledge in sustainable or green chemistry biomanufacturing)	6
Lygos	1 (skills in project management and bioprocess development)	5

As stated above, we have been working with these industry partners on curriculum development, student learning outcomes, capstone design, one-week onsite training, and industry internship programs. Their inputs are extensively integrated into the advanced certificate program. They all pointed out the critical elements of project management, leadership, and social skill training in workforce training.

h)(3) ***Similar Programs:*** Use the table below to list similar programs at other institutions, public and independent, in the service area, region and state, as appropriate. Expand the table as needed. ***NOTE:*** *Detailed program-level information for SUNY institutions is available in the Academic Program Enterprise System (APES) or Academic Program Dashboards. Institutional research and information security officers at your campus should be able to help provide access to these password-protected sites. For non-SUNY programs, program titles and degree information – but no enrollment data – is available from SED's Inventory of Registered Programs.*

Institution	Program Title	Degree	Enrollment
University of Arkansas	Biomanufacturing Workforce Training	Two-week online course	N/A*
Worcester Polytechnic Institute	Biomanufacturing Education and Training Center	Offering a number of online courses in biomanufacturing	N/A*
Rutgers University-New Bruswick School of Arts and Sciences	Certificate in Biofabrication and Biomanufacturing	Certificate Program	N/A*
NC State University	Biomanufacturing Training and Education Center	Offering a number of courses for undergraduate and graduate students to receive a certificate in biomanufacturing	N/A*
Cal State LA	Biomanufacturing Sciences and Applications Online Certificate Program	One-year online certificate program	N/A*
University of Washington	Certificate in Biotechnology Project Management	8-9-month online certificate program	N/A*

Note: *We researched enrollment trends for these programs, but the publicly available institutional research websites for each did not specify program level data to allow the reporting of enrollment by certificates or by courses. We reached out to these programs, but they did not release this information to us. Additionally, there are a number of project management online certificate programs. These are all focused on training in general project management.

h)(4) **C*ollaboration:*** Did this program's design benefit from consultation with other SUNY campuses? If so, what was that consultation and its result?

N/A

h)(5) ***Concerns or Objections:*** If concerns and/or objections were raised by other SUNY campuses, how were they resolved?

N/A

2.4. Admissions

What are all admission requirements for students in this program? Please note those that differ from the institution's minimum admissions requirements and explain why they differ.

Binghamton University's advanced certificate program will allow students to develop specialized expertise to complement their main area of study, advance their career, and stand out to employers. Advanced certificate programs are available to several types of students (https://www.binghamton.edu/admissions/graduate/apply/certificate.html).

Students who express an interest in biomanufacturing project management can apply for the program as long as they meet the following admission requirements:

- **Stand-alone application**: Applicants who intend to complete the Biomanufacturing Project Management Advanced Certificate Program, but not a graduate degree, and who qualify by having a Bachelor's degree in science, engineering, management, or a closely related area.

- **Add-on Applicants**: Applicants who are currently enrolled in OR who are currently applying to a Binghamton University graduate degree program and who are additionally interested in earning an advanced certificate.

What is the process for evaluating exceptions to those requirements?

A faculty evaluation committee will be formed to evaluate exceptions to the admissions requirements. The committee will ask applicants to submit an essay or a statement to explain the reason or challenges they have encountered to prevent them from meeting the requirements. They will be also asked to explain how they will be able to make it up to advance their learning through the program. The committee will review the student's statement and interview the students if necessary. After reviewing, the committee will make a recommendation to the Program Director who will make a final decision on acceptance or denial.

How will the institution encourage enrollment in this program by persons from groups historically underrepresented in the institution, discipline or occupation?

We aim to foster a diverse and skilled network of workers who can meet the growing demands in biomanufacturing. This recruiting strategy is built upon our success with our NSF REU sites (90% of trainees were from underrepresented populations) and our HBCU-Thurgood Marshall-Watson College Alliance. Binghamton University's Watson College has recently formed an education and research alliance with six historically black colleges and universities, including Alabama A&M University, Central State University, Tuskegee University, Prairie-View A&M University, the University of the District of Columbia, and Virginia State University. The alliance offers stable student pipelines for the program. Collaboration with our industry partners will further broaden the pool of potential students. The BioMADE Workforce Training Network offers additional resources for recruiting.

2.5. Academic and Other Support Services

Summarize the academic advising and support services available to help students succeed in the program.

A Program Coordinator who will provide academic advising and support services to the student has already been hired through a grant received from the Bioindustrial Manufacturing and Design Ecosystem (BioMADE), an Air Force funded Bioindustrial Manufacturing Innovation Institute. The $1.6 million biomanufacturing workforce training grant covers from July 2024 to June 2026. The program will support the continuous appointment of the program director after June 2026. In addition, the participating faculty will also offer this assistance to the students.

2.6. Prior Learning Assessment

If this program will grant credit based on Prior Learning Assessment, describe the methods of evaluating the learning and the maximum number of credits allowed, **or check here [X] if not applicable**.

2.7. Program Assessment and Improvement

Describe how this program's achievement of its objectives will be assessed, in accordance with *SUNY policy*, including the date of the program's initial assessment and the length (in years) of the assessment cycle. Explain plans for assessing achievement of students' learning outcomes during the program and success after completion of the program. Append at the end of this form, a plan or curriculum map showing the courses in which the program's educational and, if appropriate, career objectives – from Item 2.3(b) of this form – will be taught and assessed. *NOTE: The University Faculty Senate's Guide for the Evaluation of Undergraduate Programs is a helpful reference.*

The attainment of the program's education objectives will be assessed yearly in consultation of alumni, representatives from our industry partners. The SLOs are reviewed and assessed through a combination of the following mechanisms:

* **BPM Program Advisory Board (PAB) Review**: The PAB will include alumni and representatives from industry. For the first year, we will include representatives from industry in the PAB review, as no alumni will be available to serve on the board until the second year. The PAB will meet once a year to discuss and review the SLOs and curriculum. The PAB members will provide feedback to the BPM Program on the relevance and significance of the SLOs to the workforce training and the constituency that they represent. All the faculty and instructors will attend the PAB meeting. The PAB will make its recommendations in its report to the Director of the BPM Advanced Certificate Program. These recommendations will be discussed thoroughly by faculty in the Program's summer retreat and at a follow-up faculty meeting that will be normally held in the second week of each Fall semester. Responses to the recommendations will be provided to the PAB members by the Director of the program for further review. The Program's summer retreat will be a one-day event.

* **Student Exit Survey**: Students will be asked about the relevance of the SLOs to their post-BPM career plans. All students will fill out the exit survey. The survey results will be discussed in the program faculty meeting and used for assessing SLOs and for continuously improving the curriculum based on these assessments.

* **Alumni Survey**: An alumni survey will be performed through email and social media such as LinkedIn. The program will establish a social network to connect with its alumni through Facebook and/or LinkedIn. This survey will be used to track students' career paths and can be used as a method of evaluation. Alumni will serve on the Program Advisory Board. They will provide inputs to the Program Director and help improve the program.

* **Student Advisory Committee (SAC):** A SAC consisting of students will be formed to provide feedback on the curriculum. The Director of the Program will meet with the SAC once a training cycle to request their feedback on SLOs and the curriculum. This feedback will be discussed at program faculty meeting and used as a method for continuous improvement of the program.

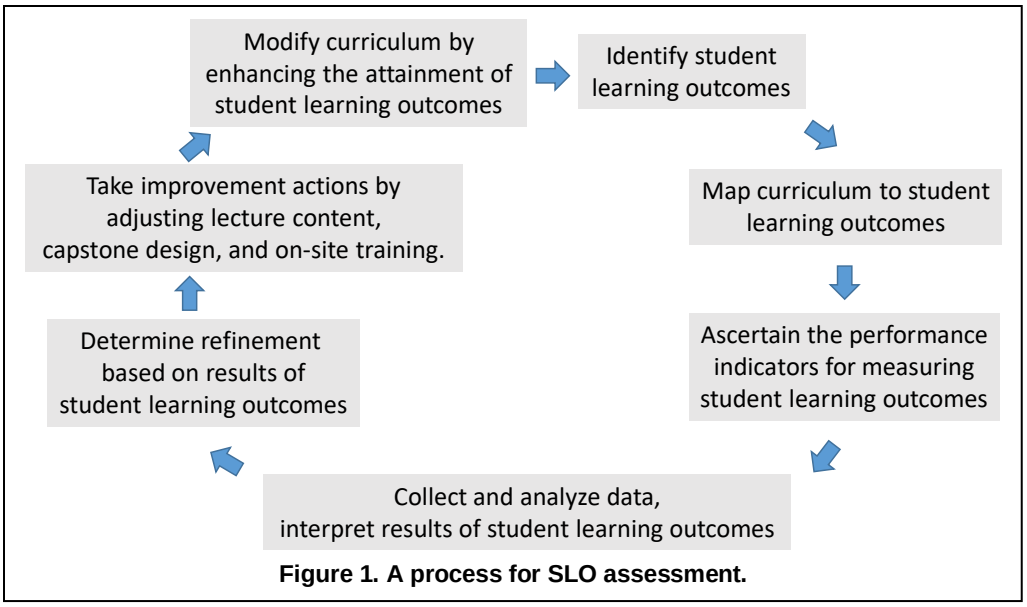

Figure 1. A process for SLO assessment.

Fig. 1 depicts an assessment process designed to assess the attainment of SLOs. Homework assignments, exams, quizzes, the capstone design report, and the optional one-week, on-site training report that are tied to the SLOs will be collected at the end of each training cycle. These data will be quantitatively and qualitatively analyzed and discussed at the program's annual summer retreat and its follow-up program faculty meeting that will be held in September every year to evaluate and assess the attainment of the SLOs by the students.

The instructor of each course will be responsible for developing one or two proficiency tests based on the performance indicators (PIs) shown in Table 1 for assessing each SLO. The instructor, in consultation with the Program Assessment Committee, will set the targets or expected level of attainment for assessing each SLO using these tests. These tests along with the targets will be reviewed and approved by faculty during the Program's summer retreat.

Table 1. A Summary of SLOs (1-3), Performance Indicators (PIs) (1-1, 1-2, …) and Courses Used to Assess the Attainment of SLOs

SLO1: An ability to identify, formulate, and solve complex biomanufacturing and project management problems by applying principles of biomanufacturing engineering and project management science

1-1. Identify critical steps in a biological response to bioprocesses and data-driven management interfacing with operators [BME 500, BME 510, PM 500, and PM 510]

1-2. Apply green chemistry biomanufacturing and project management principles to achieve analytical or numerical solutions to real world biomanufacturing systems [BME 521, BME 530, and PM 530]

1-3. Identify and formulate sophisticated biomanufacturing and management problems [BME 550 and PM 550]

1-4. Know how to obtain relevant biomanufacturing and project management data from internet database [BME 540 and PM 530]

SLO2: An ability to collaborate effectively on a team.

3-1. Write clear and organize documents with appropriate conciseness. [BME 550 and PM 550]

3-2. Present clear presentations (often including PowerPoint presentation slides) and answer follow-up questions. [BME 521 and BME 550]

3-3. Communicate effectively, both orally and in writing. [PM 550]

SLO3: An ability to acquire and apply new knowledge through life-long learning strategy

4-1. Understand professional and ethical responsibility. [BME 521]

4-2. Able to evaluate ethical dimensions of a problem in the discipline. [BME 530 and PM 520]

4-3. Evaluate conflicting/competing social values in order to make informed decisions about an biomanufacturing project management solution. [BME 530 and PM 550]

4-4. Demonstrate abilities to reach out to professions outside of biomanufacturing to identify what is at "cutting edge" of various industries. [BME 550 and PM 550]

Section 3. Program Schedule and Curriculum

Complete the **SUNY Program Schedule for Certificate and Advanced Certificate Programs** to show how a typical student may progress through the program.

NOTE: *For an undergraduate certificate program, the* ***SUNY Program Schedule for Certificate and Advanced Certificate Programs*** *must show* ***all curricular requirements and the number of terms required to complete them.*** *Certificate programs* ***are not required*** *to conform to SUNY's and SED's policies on credit limits, general education, transfer and liberal arts and sciences.*

EXAMPLE FOR ONE TERM: Program Schedule for Certificate Program

Term 2: Fall 20xx			
Course Number & Title	**Cr**	**New**	**Prerequisite(s)**
ACC 101 Principles of Accounting	4		
MAT 111 College Mathematics	3		MAT 110
CMP 101 Introduction to Computers	3		
HUM 110 Speech	3	X	
ENG 113 English 102	3		
Term credit total:	16		

NOTE: *For a graduate advanced certificate program, the* ***SUNY Sample Program Schedule for Certificate and Advanced Certificate Programs*** *must include all curriculum requirements. The program is* ***not required*** *to conform with the graduate program expectations from in Regulation 52.2 http://www.highered.nysed.gov/ocue/lrp/rules.htm.*

a) If the program has fewer than 24 credit hours, or if the program will be offered through a nontraditional schedule (i.e., not on a semester calendar), what is the schedule and how does it impact financial aid eligibility? ***NOTE:*** *Consult with your campus financial aid administrator for information about nontraditional schedules and financial aid eligibility.*

The program consists of a set of courses that will be frequently offered and therefore is quite flexible with respect to the schedule. Courses will be 4 weeks in duration and will be taken two at a time. See below for a sample program.

b) For each existing course that is part of the proposed undergraduate certificate or the graduate advanced certificate, append, at the end of this form, a catalog description.

N/A. These are all new courses.

c) For each new course in the certificate or advanced certificate program, append a syllabus at the end of this document.

Refer to the appendices.

d) If the program requires external instruction, such as clinical or field experience, agency placement, an internship, fieldwork, or cooperative education, append a completed External Instruction form at the end of this document.

Refer to the appendices.

SUNY Graduate Sample Program Schedule

Campus Name	**Binghamton University**
Program/Track Title and Award	**Biomanufacturing Project Management Advanced Certificate Program**

Calendar Type	Semester	Quarter	Trimester	Other
				X

(Label each term in sequence, consistent with the institution's academic calendar (e.g., Fall 1, Spring 1, Fall 2)

Use the table to show how a typical student may progress through the program. Check all columns that apply to a course or enter credits where applicable. New: X if a new course. Co/Prerequisite(s): list prerequisite(s) for the noted courses.

Term 1: Weeks 1-4

Course Number & Title	Credits	New (X)	Co/Prerequisites
BME 500 Bioprocess and Biomanufacturing	2	X	
PM 500 Fundamentals of Project Management	2	X	
Term credit total:	**4.0**		

Term 2: Weeks 5-8

Course Number & Title	Credits	New (X)	Co/Prerequisites
BME 510 Biomolecular Engineering for Biomanufacturing	2	X	
PM 510 Leadership Skills in a Digital World	2	X	
Term credit total:	**4.0**		

Term 3: Weeks 9-12

Course Number & Title	Credits	New (X)	Co/Prerequisites
Biomanufacturing Elective	2	X	Course Depedent*
Project Management Elective I	2	X	PM 500 and PM 510
Term credit total:	**4.0**		

Term 4:Weeks 13-16

Course Number & Title	Credits	New (X)	Co/Prerequisites
Project Management Elective II	2	X	Course Dependent*
Term credit total:	**2.0**		

Term 5: Weeks 17-24

Course Number & Title	Credits	New (X)	Co/Prerequisites
BM 550 Biomanufacturing Project Management Capstone Design (This is an 8-week course, including an optional one-week, on-site training**)	2	X	BM 500, BME 510, PM 500 amd PM 510
Term credit total:	**2.0**		

Term 6:

Course Number & Title	Credits	New (X)	Co/Prerequisites
Term credit total:	**0.0**		

Term 7:

Course Number & Title	Credits	New (X)	Co/Prerequisites
Term credit total:	**0.0**		

Term 8:

Course Number & Title	Credits	New (X)	Co/Prerequisites
Term credit total:	**0.0**		

Program Total:	**16.0**

Identify the required comprehensive, culminating element(s), such as a thesis or examination, including course number(s), if applicable:

*, Prerequiaite for BME 521 is BME 500; Prerequisites for BME 530 are BME 500 and 510; Prerequisites for BME 540 are BME 500 and 510; prerequisites for PM 520 are PM 500 and 510; Prerequisites for PM 530 are PM 500 and 510; Prerequisite for PM 540 is PM 500; and Prerequisite for PM 550 is PM 510. **, The one-week on-site training is optional. It will not affect students' course completion if they choose opt-out of the one-week on-site training.
Biomanufacturing Electives: BME 521, BME 530, and BME 540. Project Management Electives: Track I, PM 520 or PM 530; Track II, PM 540 or PM 550

Section 4. Faculty

a) Complete the **SUNY Faculty Table** on the next page to describe current faculty and to-be-hired (TBH) faculty.

b) **Append** at the end of this document position descriptions or announcements for each to-be-hired faculty member.

NOTE: *CVs for all faculty should be available upon request. Faculty CVs should include rank and employment status, educational and employment background, professional affiliations and activities, important awards and recognition, publications (noting refereed journal articles), and brief descriptions of research and other externally funded projects. New York State's requirements for faculty qualifications are in http://www.highered.nysed.gov/ocue/lrp/rules.htm.*

c) What is the institution's definition of "full-time" faculty?

The number of titled faculty with full-time commitment to a department/division/school. This includes: faculty on sabbatical and on leave without pay, department chairs, adjunct faculty, and IFR faculty. Faculty with split appointment are counted in their department only.

SUNY Faculty Table

Provide information on current and prospective faculty members (identifying those at off-campus locations) who will be expected to teach any course in the graduate program. Expand the table as needed. Use a separate Faculty Table for each institution if the program is a multi-institution program.

(a)	(b)	(c)	(d)	(e)	(f)
Faculty Member Name and Title/Rank (Include and identify Program Director with an asterisk)	**% of Time Dedicated to This Program**	**Program Courses Which May Be Taught (Number and Title)**	**Highest and Other Applicable Earned Degrees (include College or University)**	**Discipline(s) of Highest and Other Applicable Earned Degrees**	**Additional Qualifications: List related certifications, licenses and professional experience in field**
PART 1. Full-Time Faculty					
Kaiming Ye	12.5%	BME 500, BME 521, BME 550 (co-teaching with the Program Coordinator)	PhD (East China University of Science and Technology)	Engineering	Department Chair, Director, Center of Biomanufacturing for Regenerative Medicine
Sha Jin	12.5%	BME 510, BME 530	PhD (Kyushu Institute of Technology, Japan)	Bioengineering and Bioinformatics	Undergraduate Program Director
Shelley Dionne	12.5%	PM 510 PM 520 PM 550	PhD (School of Management, Binghamton University)	Leadership and Multilevel Theory and Measurement; Group and Team Dynamics/Network	Dean, School of Management; Co-Director, Bass Center for Leadership Studies
Chou-Yu Tsai	12.5%	PM 500 PM 530 PM 540	PhD (School of Management, Binghamton University)	Strategic Leadership, Project Management, Entrepreneurship, Research Method and Data Analytics	Associate Director, Bernard M. & Ruth R. Bass Center for Leadership Studies PhD Program Coordinator, Leadership and Organizational Science Area (LOS)
Part 2. Part-Time Faculty					
Part 3. Faculty To-Be-Hired (List as TBH1, TBH2, etc., and provide title/rank and expected hiring date)					
Program Coordinator (TBD)	12.5%	BME 550 (co-teaching)	MS	Biomedical Engineering	

Section 5. Financial Resources and Instructional Facilities

a) What is the resource plan for ensuring the success of the proposed program over time? Summarize the instructional facilities and equipment committed to ensure the success of the program. Please explain new and/or reallocated resources over the first five years for operations, including faculty and other personnel, the library, equipment, laboratories, and supplies. Also include resources for capital projects and other expenses.

We were awarded a two-year grant ($1.6 million, including $800,000 cost sharing from Binghamton University) from the Air Force Defense Research Sciences Program, and subawarded from the BioMADE—an Bioindustrial Manufacturing and Design Ecosystems. The grant starts on July 1st, 2024 and ends on June 30, 2026. The grant covers all of the costs for developing the program, including hiring a program coordinator, covering one month of summer salary for a faculty member to develop the curriculum, costs for the optional one-week, on-site training, and operational costs such as the cost for online teaching. We will use a well-established on-line lecturing system at Binghamton University to offer these courses.

While the BioMADE funding will enable us to develop and launch the program, the program will become sustainable with the tuition collected from the students and with collaboration with our industry partners. We will identify additional resources to sustain and expand the program after the award ends, including New York State's Office of Strategic Workforce Development Grant that offers $1 million for operation and $3 million for infrastructure. Moreover, we will work with the BioMADE Workforce Training Leadership Team to identify more industry partners to expand the program and pool of potential students and capstone project mentors. Initially, we will target 20-30 students per cycle; then, we will scale it up to enroll 50 or more within five years from launching. Our vision is to create a national BPM training network.

b) Complete the five-year SUNY Program Expenses Table, below, consistent with the resource plan summary. Enter the anticipated academic years in the top row of this table. List all resources that will be engaged specifically as a result of the proposed program (e.g., a new faculty position or additional library resources). If they represent a continuing cost, new resources for a given year should be included in the subsequent year(s), with adjustments for inflation or negotiated compensation. Include explanatory notes as needed.

SUNY Program Expenses Table

(OPTION: You can paste an Excel version of this schedule AFTER this sentence, and delete the table below.)

SUNY Program Expenses Table

SUNY Program Expenses Table

Program Expense Categories	Expenses (in dollars)					
	Before Start*	**Academic Year 1:**	**Academic Year 2:**	**Academic Year 3:**	**Academic Year 4:**	**Academic Year 5:**
YEAR *(example 2013)*		2025	2026	2027	2028	2029
(a) Personnel (including faculty, program coordinator, program Director stipend, and all others)	$0	$80,400	$186,812	$192,416	$197,735	$204,921
(b) Library	$0	$0	$0	$0	$0	$0
(c) Equipment	$0			$5,000	$5,000	$5,000
(d) Laboratories	$0	$0	$0	$0	$0	$0
(e) Supplies	$0	$0	$5,000	$5,000	$5,000	$5,000
(f) Capital Expenses	$0	$0	$0	$0	$0	$0
(g) Other (Advertisement, student recruiting, outreach to industrial partners, etc.)	$0	$10,000	$90,000	$90,000	$90,000	$90,000
(h) Sum of Rows Above	**$0**	**$90,400**	**$281,812**	**$292,416**	**$297,735**	**$304,921**

Explanatory notes: BioMADE provided $800,000 along with $800,000 matching to support launching the program. We budget $24,000 (a fringe-free state line in either PSR or SUTRA account) as stipend for program director and $6,700 ($10k for a 3-credit course) for faculty to teach a 2-credit course with 3% annual living cost adjustment. Four faculty members, including Shelley Dionne, Chou-Yu Tsai, Kaiming Ye, and Sha Jin, will teach all of the 12 courses prescribed in the program. Starting Year 2 (2026), we request $80,000 (a fringe-free state line in either PSR or SUTRA account) for a program coordinator responsible for day-to-day operation, including recruiting, on-line teaching management, student interaction, internship, capstone design, etc. A grant from BioMADE covers the salary plus fringe for the program coordinator from July 2024 to June 2026. We also request additional $10,000 to support guest lectures from industry partners and their consultation on our curriculum; $5,000 each year to update on-line teaching equipment, such as interactive screen and laptop, starting year 3; $5,000 each year for preparing teaching materials, such as the purchasing of textbooks, office supplies, and social events for students; and $80,000 for student recruitment and outreach to industrial partners.

Section 6. Library Resources

NOTE: *This section does not apply to certificate or advanced certificate programs.*

Section 7. External Evaluation

NOTE: *This section does not apply to certificate or advanced certificate programs.*

Section 8. Institutional Response to External Evaluator Reports

NOTE: *This section does not apply to certificate or advanced certificate programs.*

Section 9. SUNY Undergraduate Transfer

NOTE: *This section does not apply to certificate or advanced certificate programs.*

Section 10. Application for Distance Education

a) Does the program's design enable students to complete 50% or more of the course requirements through distance education? [ ] No [X] Yes. If yes, **append** a completed *SUNY Distance Education Format Proposal* at the end of this proposal to apply for the program to be registered for the distance education format.

b) Does the program's design enable students to complete 100% of the course requirements through distance education? [ ] No [X] Yes

Section MPA-1. Need for Master Plan Amendment and/or Degree Authorization

NOTE: *This section does not apply to certificate or advanced certificate programs.*

List of Appended Items

Appended Items: Materials required in selected items in Sections 1 through 5 and Section 10 of this form should be appended after this page, with continued pagination. In the first column of the chart below, please number the appended items, and append them in number order.

Number	Appended Items	Reference Items
	For multi-institution programs, a letter of approval from partner institution(s)	Section 1, Item (e)
	For programs leading to professional licensure, a side-by-side chart showing how the program's components meet the requirements of specialized accreditation, Commissioner's Regulations for the Profession, or other external standards	Section 2.3, Item (e)
	For programs leading to licensure in selected professions for which the SED Office of the Professions (OP) requires a specialized form, if required by OP	Section 2.3, Item (e)
	OPTIONAL: For programs leading directly to employment, letters of support from employers, if available	Section 2, Item 2.3 (h)(2)
See section 2.7	For all programs, a plan or curriculum map showing the courses in which the program's educational and (if appropriate) career objectives will be taught and assessed	Section 2, Item 7
	For all programs, a catalog description for each existing course that is part of the proposed program	Section 3, Item (b)
1	For all programs, syllabi for all new courses in the proposed program	Section 3, Item (c)
2	For programs requiring external instruction, *External Instruction Form* and documentation required on that form	Section 3, Item (d)
	For programs that will depend on new faculty, position descriptions or	Section 4, Item (b)

	announcements for faculty to-be-hired	
3	For programs designed to enable students to complete at least 50% of the course requirements at a distance, a *Distance Education Format Proposal*	Section 10

Course number and Name: BME 500 Bioprocess and Biomanufacturing

Credits: 2

Contact hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name(s) of instructor: Dr. Kaiming Ye

Instructional Materials:
- Michael Shuler, Fikret Kargi, and Matther DeLisa, "Bioprocess Engineering: Basic Concepts", 3rd edition, Pearson. ISBN-13 978-0138062706, 2017
- Chander Praskash, Sunpreet Singh, Rupinder Singh, Seeram Ramakrishna, B. S. Pabvla, Sanjeev Puri, M.S. Uddin (editors), "Biomanufacturing," Springer, ISBN-13 9783030139506, 2019
- Handouts (In the form of draft textbook prepared by the instructor)

Specific course information:
This course introduces both the basic and advanced topics in bioprocess and biomanufacturing, including batch, fed-batch and continuous fermentation, scaling up and scaling out, bioreactor design and operation, medium preparation, sterilization, process control and monitoring, enzyme kinetics, cell growth, product purification and validation, packaging and supply chain. Additionally, the course will include several case studies in bioprocess development and management.

Course Objectives:
- Provide a comprehensive introduction to bioprocess and biomanufacturing
- Expose students to the fundamental principles behind bioprocess design, operation and management
- Reinforce students' skills in solving real-world problems through case studies

Course Prerequisites: in good standing in the advanced certificate program.

Brief list of topics to be covered:
- Introduction
- Cells and Biomanufacturing
- Bioreactor and Fermentation Design
- Cell Culture Medium
- Sterilization
- Types of bioreactors
- Operation of biomanufacturing Processes
- Control and monitoring of biomanufacturing Processes
- Downstream and Upstream of biomanufacturing Processes
- Case Study 1: Penicillin Fermentation
- Case Study 2: Scaling up Biomanufacturing Processes

Homework Assignments. Homework assignments will be provided in the class and completed assignments must be electronically submitted before the due date/time via Brightspace, unless otherwise specified. Email submissions or late submissions will not be accepted except in special circumstances such as illness, family emergencies, religious observances, jury duty or military duty.

Project. A project will be assigned in the middle of the course. Detailed information will be provided by the instructor.

Exam. Exams will be derived from material covered in the class, including the materials from the textbook and any additional handouts. Students will be required to notify the instructor in advance of any absence; an unexcused absence on the day of the exam will result in a zero score.

Grading:
Grades will be determined by a cumulative average of exams, homework, and project.

Homework	30%
Project	30%
Exam 1	20%
Exam 2	20%

Grade:	A: 93-100	A-: 90-92.99	B+: 87-89.99	B: 83-86.99	B-: 80-82.99
	C+: 77-79.99	C: 73-76.99	C-: 70-72.99		
	D+: 67-69.99	D: 63-66 .99	D-: 60-62.99	F: 0-59.99	

MEASUREMENT OF LEARNING OBJECTIVES

The graded assignments are designed to assess various facets of students' learning objectives. All students are required to complete the assignments described above. Each student's final grade for the course will depend upon the quality and quantity of work performed. Grades will be calculated as a weighted mean of the grades earned for each assignment described.

BRIGHTSPACE

We will use Brightspace for posting materials and distributing notices to class members. The instructor reserves the right to modify any or all of the contents of this syllabus to better meet the needs of the college and its students. Please note that all changes will be documented on Brightspace.

ACADEMIC INTEGRITY AND DISHONESTY
All students are expected to adhere to the Binghamton University Code of Student Conduct. Binghamton University expects everyone to operate at the highest levels of academic integrity. The *Official Student Handbook* and other documents make the policies and procedures on this issue clear. You will receive a score of zero for the first instance of academic dishonesty in this course. The penalty for the second offense is a failing grade in the course. Beyond cheating, plagiarism (i.e., quoting or paraphrasing passages from other sources and then placing them in your writings/papers without referencing the original source) is also considered to be academic dishonesty and cheating in this course.

ZOOM ETIQUETTE (GUEST SPEAKER SERIES)
If camera access is possible, students are expected to turn their cameras on during Zoom meetings and keep their mics muted unless they speak. Their Zoom screen names must be their full names. You are welcome to use an appropriate virtual background if you wish.

Course number and Name: BME 510 Biomolecular Engineering for Biomanufacturing

Credits: 2

Contact hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Wednesday or by appointment.

Course Prerequisites: in good standing in the advanced certificate program

Name(s) of instructor: Dr. Sha Jin

Instructional Materials:
- Bernard R. Glick and Cheryl L. Patten. Molecular Biotechnology: Principles and Applications of Recombinant DNA. (6th ed.) (2022) John Wiley & Sons, Inc. ASM press. ISBN: 978-1683673651
- Handouts (In the form of draft textbook prepared by the instructor)

Specific course information:
This course introduces the sustainable manufacturing of biomolecules including medicines, polymers, and food through biological systems. The course covers advanced biotechnologies for biomanufacturing of commercial products by using microorganisms, recombinant microorganisms, recombinant animal cells in varied types of bioreactor systems. It discusses up-to-date techniques for the manipulation of cells by genetic engineering, synthetic biology, genome editing, and metabolic engineering. Topics include strain design and improvement, biomanufacturing, product purification process, artificial intelligence-assisted manufacturing, sensors for monitoring of bioprocessing, biosynthetic pathway analysis for optimal biomanufacturing, and genome editing approaches for sustainable production. Additionally, the course discusses challenges and future directions of implementing biological systems for the production of novel biomolecules.

Educational Objectives for the Course:
After completing this course, students should be able to:
- understand basic principles of molecular engineering and biomanufacturing
- formulate and solve biomanufacturing problems using advanced biotechnologies
- identify potential career opportunities in the field
- master skills for life-long learning in biomanufacturing

Brief list of topics to be covered:
- Introduction
- Genetic engineering for efficient biomanufacturing
- Microorganisms for biosynthesis and production of biomolecules
- Mammalian cells for recombinant medicine manufacturing
- Genome editing for sustainable production of biomolecules
- Review and study analysis, and examination 1
- Bioreactors including modeling of mass transfer and mass balance, and sensors.
- Artificial intelligence-aided manufacturing of biomolecules
- Metabolic pathway analysis for optimal biomanufacturing
- Challenges and future directions in Biomanufacturing of novel biomolecules
- Review and study analysis, and examination 2

Homework Assignments. Homework assignments will be provided in the class and completed assignments must be electronically submitted before the due date/time via Brightspace, unless otherwise specified. Email submissions or late submissions will not be accepted except in special circumstances such as illness, family emergencies, religious observances, jury duty or military duty.

Project. A project will be assigned in the middle of the course. Detailed information will be provided by the instructor.

Exam. Exams will be derived from material covered in the class, including the materials from the textbook and any additional handouts. Students will be required to notify the instructor in advance of any absence; an unexcused absence on the day of the exam will result in a zero score.

Grading:
Grades will be determined by a cumulative average of exams, homework, and project.

Homework	25%
Project	25%
Exam 1	25%
Exam 2	25%

Grade:	A: 93-100	A-: 90-92.99	B+: 87-89.99	B: 83-86.99	B-: 80-82.99
	C+: 77-79.99	C: 73-76.99	C-: 70-72.99		
	D+: 67-69.99	D: 63-66 .99	D-: 60-62.99	F: 0-59.99	

MEASUREMENT OF LEARNING OBJECTIVES

The graded assignments are designed to assess various facets of students' learning objectives. All students are required to complete the assignments described above. Each student's final grade for the course will depend upon the quality and quantity of work performed. Grades will be calculated as a weighted mean of the grades earned for each assignment described.

BRIGHTSPACE

We will use Brightspace for posting materials and distributing notices to class members. The instructor reserves the right to modify any or all of the contents of this syllabus to better meet the needs of the college and its students. Please note that all changes will be documented on Brightspace.

ACADEMIC INTEGRITY AND DISHONESTY
All students are expected to adhere to the Binghamton University Code of Student Conduct. Binghamton University expects everyone to operate at the highest levels of academic integrity. The *Official Student Handbook* and other documents make the policies and procedures on this issue clear. You will receive a score of zero for the first instance of academic dishonesty in this course. The penalty for the second offense is a failing grade in the course. Beyond cheating, plagiarism (i.e., quoting or paraphrasing passages from other sources and then placing them in your writings/papers without referencing the original source) is also considered to be academic dishonesty and cheating in this course.

ZOOM ETIQUETTE (GUEST SPEAKER SERIES)
If camera access is possible, students are expected to turn their cameras on during Zoom meetings and keep their mics muted unless they speak. Their Zoom screen names must be their full names. You are welcome to use an appropriate virtual background if you wish.

Course number and Name: BME 521 Biomanufacturing for Green Chemistry

Credits: 2

Contact hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name(s) of instructor: Dr. Sha Jin

Instructional Materials:
- John Andraos, Albert S. Matlack, "Introduction to Green Chemistry," CRC Press, ISBN 9780367470487, 2022
- Handouts (In the form of draft textbook prepared by the instructor)

Specific course information:
This course introduces both the basic and advanced topics in green chemistry and environmental consideration of biomanufacturing, including toxicity of chemical and biological manufacturing, waste and its minimization, design more eco-friendly biomanufacturing processes for green chemistry, working without organic solvents, materials for a sustainable economy, recycling, environmental impact of biomanufacturing and the way to minimize it, and matrices for green chemistry biomanufacturing

Course Objectives:
- Provide a comprehensive introduction to green chemistry
- Empower students with knowledge and skills in designing a biomanufacturing process for green chemistry
- Raising awareness of biomanufacturing's environmental impact and the way to minimize it

Course Prerequisites: BME 500

Brief list of topics to be covered:
- Introduction
- Solid Catalysts and Reagents for Ease of Workup
- Solid Acids and Bases
- Biochemical Separation
- Working without Organic Solvents
- Biocatalysis and Biodiversity
- Materials for sustainable economy
- Biochemistry of Recycling
- Energy and the Environment
- Population and the Environment
- Environmental Economics
- Biomanufacturing Greening
- Metrics for Biomanufacturing Green Chemistry

Homework Assignments. Homework assignments will be provided in the class and completed assignments must be electronically submitted before the due date/time via Brightspace, unless otherwise specified. Email submissions or late submissions will not be accepted except in special circumstances such as illness, family emergencies, religious observances, jury duty or military duty.

Project. A project will be assigned in the middle of the course. Detailed information will be provided by the instructor.

Exam. Exams will be derived from material covered in the class, including the materials from the textbook and any additional handouts. Students will be required to notify the instructor in advance of any absence; an unexcused absence on the day of the exam will result in a zero score.

Grading:
Grades will be determined by a cumulative average of exams, homework, and project.

Homework	30%
Project	30%
Exam 1	20%
Exam 2	20%

Grade:	A: 93-100	A-: 90-92.99	B+: 87-89.99	B: 83-86.99	B-: 80-82.99
	C+: 77-79.99	C: 73-76.99	C-: 70-72.99		
	D+: 67-69.99	D: 63-66 .99	D-: 60-62.99	F: 0-59.99	

MEASUREMENT OF LEARNING OBJECTIVES

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ZOOM ETIQUETTE (GUEST SPEAKER SERIES)
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Course number and Name: BME 530 Sustainable Bioprocess Design and Scale-up

Credits: 2

Contact hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Wednesday or by appointment.

Course Prerequisites: BME 500 and BME 510

Name(s) of instructor: Dr. Sha Jin

Instructional Materials:

- John Villadsen, Jens Nielsen, and Gunnar Lidén. Bioreaction Engineering Principles. (3rd ed.) (2011) Springer. ISBN-13: 978-1441996879
- Handouts (In the form of draft textbook prepared by the instructor)

Specific course information:

This course introduces and discusses updated biotechnologies aiming to produce goods using biological systems that are environmentally friendly. In recognition of the fast pace at which the sustainable biotechnology is moving, the course combines existing bioreaction engineering principles with up-to-date knowledge pertaining to the design and scale-up for a sustainable production of industrial goods. Additionally, the course entails case studies to discuss innovative approaches that would help meet the goal of net-zero targets to reduce climate change and carbon emissions. Topics include unique strains as a tool and factory to improve protecting the environment, bioreaction engineering, control of metabolic networks for sustainable production of bioproducts, scale-up issues for large industrial bioreaction. The course also discusses challenges and future directions in the field of sustainable bioprocesses both in small and in industrial scale.

Educational Objectives for the Course:

After completing this course, students should be able to:

- understand basic principles of bioreaction engineering, approaches and challenges in sustainable bioprocess
- formulate and solve sustainable bioprocess problems using advanced biotechnologies
- identify potential career opportunities in the field
- master skills for life-long learning in sustainable bioprocess engineering

Brief list of topics to be covered:

- Introduction
- Design of bioprocesses: criteria for commercial success: strain design and selection, criteria for design and optimization of a fermentation process, and strain improvement.
- Growth kinetics of cell cultures
- Design of fermentation processes
- Production of industrial goods using gas fixation strains, mitigating the emission of greenhouse gases.
- Sustainable bioconversion of food waste into industrial products for environmental protection: analysis of the metabolism of lactic acid bacteria, production of eco-friendly polymers from waste.
- Metabolic network analysis-aided genetic modification for sustainable bioprocess

- Scale-up issues for large industrial bioreactors: mixing, characterization of mixing efficiency, power consumption
- Engineering issues in a bioprocess with high viscosity media
- Challenges and future directions in the sustainable bioprocess in small and industrial scale
- Review and study analysis, and examination

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Project. A project will be assigned in the middle of the course. Detailed information will be provided by the instructor.

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Grading:
Grades will be determined by a cumulative average of exams, homework, and project.

Homework	30%
Project	35%
Exam	35%

Grade:	A: 93-100	A-: 90-92.99	B+: 87-89.99	B: 83-86.99	B-: 80-82.99
	C+: 77-79.99	C: 73-76.99	C-: 70-72.99		
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MEASUREMENT OF LEARNING OBJECTIVES

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Course number and Name: BME 540 AI and Biomanufacturing Data and Statistical Analysis

Credits: 2

Contact hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name(s) of instructor: Dr. Kaiming Ye

Instructional Materials:

- Mishra, S. M. K., Polkowski, Z., Borah, S., and Dash, R., (edited) "AI in Manufacturing and Green Technology," CRC Press, ISBN 9780367537401, 2021
- Coffey, T. and Yang, H. "Statistical for Biotechnology Process Development," ISBN 9780367657222, Chapman and Hall, 2020
- Handouts (In the form of draft textbook prepared by the instructor)

Specific course information:

This course covers fundamental knowledge in AI, computer and data sciences in biomanufacturing, including basic concept of machine learning, data preparation for machine learning and artificial intelligent biomanufacturing design and control, green chemistry biomanufacturing design and automation. Additionally, the course provides students training in biostatistical analysis and its application in biomanufacturing, filled with case studies and examples to demonstrate how statistics can be performed in modern software and used in biotech.

Course Prerequisites: BME 500 and BME 510

Course Objectives:

- Engage student interest in AI, computer and data sciences in biomanufacturing
- Empower students with knowledge and skills in biostatistical analysis

Brief list of topics to be covered:

- Introduction
- Artificial intelligence
- Machine learning design
- Data preparation and mining
- Database
- Machine learning and pattern recognition
- Intelligent biosystems
- Automation control
- Biosystem and control engineering
- Computer Sciences
- Statistical theory and methods
- Statistics
- Statistics and Probability
- Statistics and its application in biomanufacturing

Homework Assignments. Homework assignments will be provided in the class and completed assignments must be electronically submitted before the due date/time via Brightspace, unless otherwise specified. Email submissions or late submissions will not be accepted except in special circumstances such as illness, family emergencies, religious observances, jury duty or military duty.

Project. A project will be assigned in the middle of the course. Detailed information will be provided by the instructor.

Exam. Exams will be derived from material covered in the class, including the materials from the textbook and any additional handouts. Students will be required to notify the instructor in advance of any absence; an unexcused absence on the day of the exam will result in a zero score.

Grading:
Grades will be determined by a cumulative average of exams, homework, and project.

Homework	30%
Project	30%
Exam 1	20%
Exam 2	20%

Grade:	A: 93-100	A-: 90-92.99	B+: 87-89.99	B: 83-86.99	B-: 80-82.99
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Course number and Name: BME 550 Biomanufacturing Project Management Capstone Design

Credits: 2

Contact hours: 3.125 hours of instruction per week (This is an 8-week online course. For each credit hour, students will receive 1.5625 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name(s) of instructor: Dr. Kaiming Ye

Instructional Materials:

- Handouts (In the form of draft textbook prepared by the instructor)

Specific course information:

This course offers culminating biomanufacturing project management design experience to students. It brings together topics from throughout the certificate curriculum. Students are challenged to design and deliver design solutions to open ended problems of interest to the biotechnology and biomanufacturing community. It takes students from problem definition to implementation, evaluation, redesign and execution, and a final report including technical report and oral presentation. Additionally, the course offers one-week onsite training in an industry-like green chemistry biomanufacturing facility.

Course Prerequisites: BME 500, BME 510, PM 500, and PM 510

Course Objectives:

- Engage student interest in biomanufacturing project management and broaden their view of green chemistry biomanufacturing, resource management and project management.
- Reinforce biomanufacturing project management through exposure to industry bioprocess and project management practices

Brief list of topics to be covered:

- Biomanufacturing design methodologies
- Biotech and biomanufacturing project management design methodologies
- Oral and write reports
- Leadership and management in engineering practices
- Testing protocols
- Design process and paradigms
- Evaluation and assessment
- Professional ethics in design
- Green biomanufacturing and its impact on environment
- Society impact of biomanufacturing
- One-week onsite training in an industry-like green chemistry biomanufacturing facility

An example schedule for a week-long, on-site training

Day	Training	Milestone

1	Plant and lab safety, GMP- and GLP-like data recording, feedstock characterization, DOE 1 billion Ton report on feedstocks, feedstock milling, and particle size analysis	Trained to be ready to work in an industrial biomanufacturing environment and can connect feedstocks with biofuels and bioproducts
2	Pretreatment and enzymatic hydrolysis – 1L and 10 L with various running conditions, mass, and energy balance calculation, different feedstock challenges, QC, etc.	Gain hands-on experience on the challenges of making biofuels and bioproducts under green chemistry conditions, and how to quantify the challenge.
3	Fermentation, flask level, media preparation, culture propagation, anaerobic on yeast, fermentation kinetics, intermediate and final product characterization	Gain hands-on experience in yeast fermentation to make biofuels.
4	5 L aerobic *E. coli* fermentation, and intermediate and final product characterization	Gain hands-on experience with bacteria fermentation to make a monomer for building a polymer
5	Data harvesting, interpretation, troubleshooting, reporting, and Q/A about the week-long training	Design and run a mock biomanufacturing process, and present it to the team
6	Visit and shadow at a commercial biofuel plant.	Learn the history of the bioethanol industry and about a typical day running the biorefinery.

Project Requirement

Students are required to form a team to undertake an open-ended design project applying to biomanufacturing project management fundamentals to the design and implementation of products or processes related to biomanufacturing project management.

Grading:
Grades will be determined by a cumulative average of exams, homework, and project.

Project Report	50%
On-site Training Report	20%
Oral Presentation and demonstration	30%

Grade:	A: 93-100	A-: 90-92.99	B+: 87-89.99	B: 83-86.99	B-: 80-82.99
	C+: 77-79.99	C: 73-76.99	C-: 70-72.99		
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BINGHAMTON UNIVERSITY, STATE UNIVERSITY OF NEW YORK
SCHOOL OF MANAGEMENT
COURSE SYLLABUS

Course Number and Name: PM 500 Fundamentals of Project Management

Credit: 2

Contact Hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name of Instructor: Dr. Chou-Yu (Joey) Tsai

Instructional Materials:

Books:

- ***A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*** *by Project Management Institute (PMI):* This book is the go-to reference for project management standards and guidelines, covering the essential framework for managing projects across industries.
- ***Scrum: The Art of Doing Twice the Work in Half the Time*** *by Jeff Sutherland*; A practical guide to Scrum methodology, this book explains how to implement Agile principles to increase efficiency and productivity in project management.
- ***The Lean Startup*** *by Eric Ries*; This book introduces Lean principles and iterative project management techniques that can be applied to any project to minimize waste and maximize value.
- ***Project Management for Dummies*** *by Stanley E. Portny*; A beginner-friendly book that simplifies project management concepts, helping readers understand the basics of managing time, resources, and deliverables.
- ***Agile Project Management with Kanban*** *by Eric Brechner*; Focused on Kanban methodology, this book teaches how to use this visual management tool to manage project workflows and enhance team collaboration.
- ***Making Things Happen: Mastering Project Management*** *by Scott Berkun*; This book focuses on real-world project management challenges and offers insights into how to overcome obstacles and successfully lead teams to deliver results.

Podcasts:

- ***Project Management Podcast*** by Cornelius Fichtner
- ***Agile for Humans*** by Ryan Ripley
- ***The PMO Podcast*** by Mark Perry
- ***Manage This: The Project Management Podcast*** by Velociteach**,**
- ***The Daily Standup*** by Scrum.org

Online Resources:

- *PMI.org*
- *Agile Alliance*

- *Trello*
- *Asana*
- *Monday*

Specific Course Information:

This course is designed to provide managers and professionals with project management skills tailored to complex and large-scale projects. Throughout the program, participants will learn how to effectively lead projects by mastering key principles, methodologies, and tools necessary for successful project planning, execution, and delivery. The course covers various project management frameworks, including traditional (Waterfall) and modern agile methodologies, essential for managing dynamic projects in fast-paced industries. It also emphasizes the practical application of industry-standard project management tools, such as Gantt charts, work breakdown structures (WBS), and task management software, enabling managers to monitor progress, handle risks, and make informed decisions in real time. By focusing on real-world challenges, the course prepares managers to handle the complexity of cross-functional teams, resource allocation, budgeting, and timely project completion in an environment often subject to change and uncertainty. Upon completion, participants will possess the core technical skills and be ready to lead projects with a strategic mindset, balancing the demands of cost, time, and quality to achieve project success.

Course Prerequisites: In good standing in the advanced certificate Program

Course Objectives:

By the end of this course, participants should be able to:

- PM principles, methodologies, & terminology
- Project scope exploration: time/schedule, cost/resources, and quality
- Stakeholder identification and management
- Risk management techniques
- Strategies for navigating changes and smooth transitions
- Agile Methodologies
- Application and mastery of various task management tools/software.

Brief List of Topics to Be Covered:

Week	Sessions	Topics Covered	Assignments
1	**Theme**	**Introduction to Project Management and Initiation**	
	Session 1a	• Introduction to Project Management • Project life cycle • Key challenges in project management • Overview of Waterfall, Agile, and Hybrid models	Team forming
	Session 1b	• Project Initiation and Defining Scope • Creating project charters • Stakeholder identification and management	

		• Developing a business case for projects	
2	**Theme**	**Planning and Resource Management**	
	Session 2a	• Work Breakdown Structure (WBS) and Gantt Charts • Using Gantt charts for scheduling • Resource Planning and allocation	**HW1:** **Create a WBS and Gantt chart for the project initiated in Week 1.**
	Session 2b	• Risk Management • Identifying risks and mitigation strategies • Case studies on risk management	
3	**Theme**	**Execution and Quality Control**	
	Session 3a	• Project Execution • Managing teams and communication • Procurement and vendor management • Ensuring alignment with project objectives	**HW2:** **Create a quality control plan for a project.**
	Session 3b	• Quality Control • Importance of quality management • Techniques for ensuring product/process quality • Managing compliance and audits	
4	**Theme**	**Monitoring, Closing, and Professional Development**	
	Session 4a	• Monitoring and Controlling Projects • Techniques for tracking progress • Managing changes and scope creep • Status reporting	**Final Project:** Submit a comprehensive project management plan covering all stages of a project.
	Session 4b	• Project Closing and Lessons Learned • Steps to closing out a project • Post-project review • Professional development and certification paths	

COURSE ASSIGNMENTS

Team Assignments

1. ***Homework*** (*40 %*). There are two homework assignments (20% for each) for each team. ***Deadlines: XX/XX & XX/XX, 11:59 pm***.

2. ***Final Project*** (*30 %*).
   Deadline: XX/XX, 11:59 pm.

3. ***Project Presentations*** (*10%*). You will give a ***15-minute*** presentation of your project and management plan at the final sessions. It is required to include every team member to participate in the presentation.

4. ***Class Participation*** (*20%*). You will be expected to contribute significantly to the class exercises and discussion.

****** Late Work Will Not Be Accepted - Please Plan Accordingly ******

******Your scores for team assignments may change based on individual peer reviews******

GRADES

Item	Level	Proportion
Homework	Team	40 %
Final Projects	Team	30 %
Project Presentation	Team	10 %
Class Participation	Individual	20%

I'll convert your final point grade (*rounded into the nearest integer*) into a letter grade as follows:

Points	Grade
94 points or above	A
90 – 93	A-
87 – 89	B+
84 – 86	B
80 – 83	B-
77 – 79	C+
74 – 76	C
70 – 73	C-
60 – 69	D
below 60 points	F

The following grading system applies to graduate students:

For an A: The student has demonstrated exceptional achievement including knowledge of organizational theories and concepts; good presentation, leadership, analytical, research, and writing skills; and active, and prepared participation in class.

For a B: The student has demonstrated substantial knowledge of organizational theories and concepts; good presentation, leadership, analytical, research, and writing skills; and prepared participation in class.

For a C: The student has demonstrated acceptable but substandard knowledge of organizational theories and concepts; moderate presentation, leadership, analytical, research, and writing skills; and prepared participation in class.

For a D: The student has demonstrated poor knowledge of organizational theories and concepts; presentation, leadership, analytical, research, and writing skills; and participation in class. D is a failing grade for graduate students.

For an F: The student has demonstrated work that is unworthy of any credit.

If you feel that a grade is incorrect, notify me in writing (email qualifies) within one week of receiving the grade. Provide a rationale for your position. If you feel the issue is not resolved after considering my response, please contact me to schedule a Zoom/physical meeting.

MEASUREMENT OF LEARNING OBJECTIVES

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BINGHAMTON UNIVERSITY, STATE UNIVERSITY OF NEW YORK
SCHOOL OF MANAGEMENT
COURSE SYLLABUS

Course Number and Names: PM 510 Leadership Skills in a Digital World

Credits: 2

Contact Hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name of Instructor: Dr. Shelley Dionne

Instructional Materials:

Books:

- ***Think Again*** *by Adam Grant*
- ***Any Given Team*** *by Ray McLean*
- ***Belonging*** *by Owen Eastwood*
- ***Multipliers*** *by Liz Wiseman*
- ***Quiet*** *by Susan Cain*

Podcasts:

- ***Team Building Saves the World*** *by Rich Rininsland*
- ***Team Anywhere Leadership Podcast*** *by Mitch Simon and Ginny Bianco-Mathis*
- ***Build a Winning Team*** *by Tim Schurrer*
- ***Team Building Podcast*** *by Jeff Cohn*
- ***Team Builders Podcast by*** *Stephen Hazley, Gerry Crowley and Jonathan Hazley*
- ***Amazing Teams Podcast by*** *Doug Dosberg and Una Japundza*
- ***Building a Culture of Collaboration by*** *Jigsaw Learning*
- ***The KAI Podcast: building better teams and great leaders*** *by The KAI Centre*

Online Resources:

- ***Any team sporting event*** *(i.e., football, baseball, basketball, soccer, doubles in tennis, pairs figure skating, rowing, rugby, etc.)*

Specific Course Information:

The use of teams within organizations is a necessary component, one employed to address problems and issues too complex and time-consuming for individuals to adequately solve. However, leadership issues in a collaborative and participative environment presents different challenges than a traditional management environment where there are clear hierarchical boundaries. And, a significant added complexity is delivering leadership and team development in a digital environment, where colleagues are not co-located. This course examines key issues regarding leadership within a digital/virtual team environment, including team building, motivation, communication, conflict management, facilitation, feedback and decision making. Students will develop team leadership skills through team building exercises, role-playing, feedback sessions, discussion and lecture periods, presentations and project development.

Course Prerequisites: In good standing in the advanced certificate program

Course Objectives:

By the end of this course, participants should be able to:

- Identify complex problems and leadership issues that arise in virtual teams/groups that impact team effectiveness
- Identify key functional leader behaviors that improve outcomes in virtual teams
- Develop effective oral and written communication skills
- Develop the ability to build inclusive groups, with an understanding of individual personality and shared mental models

Brief List of Topics to Be Covered:

Week	Sessions	Topics Covered	Assignments
1	**Theme**	**Introduction to Leadership and the Individual**	

	Session 1a	• Leadership Development
		  • Nature vs. Nurture
		  • Transferable skills	

	Session 1b	• Personality
		  • OCEAN
		  • Personality Diversity
			HW1: Personality Assessment

2	**Theme**	**Virtual Team Effectiveness and Shared Mental Models**	

	Session 2a	• Characteristics of Team Effectiveness
		  o Digital Barriers
		  o Digital Opportunities
		• Team Composition Strategies
		  o Team Personality/Assessment Information Applications
			Team Formation

	Session 2b	• Building Team Mental Models
		  o Digital Barriers
		  o Digital Opportunities
		• Team Decision Making Strategies
		  o Teambuilding Exercise
			HW2: Team Mental Model Analysis Assignment

3	**Theme**	**Functional Leadership**	
	Session 3a	• Functional Leadership • Shared Leadership	
	Session 3b	• Teamwork	
4	**Theme**	**Practicing Leadership: Presentations and Feedback**	

	Session 4a	• Team Presentations on Case Analysis	**HW3: Team Leadership Case Analysis and Team Presentations**
	Session 4b	• Peer-based leadership feedback and evaluation • Peer-based climate evaluation • Discussion of process improvement	**Final Project:** Reflection of personality, mental model and leadership interaction.

Course Assignments

Team Assignments

Individual and Team Assignments

1. *Individual Homework* (*40 %*). There are two homework assignments (20% for each). *Deadlines: XX/XX & XX/XX, 11:59 pm.*

2. *Case Analysis & Presentations (40%).* There are two components to this grade: the team case analysis and the team presentation (20% each).

3. *Final Evaluation* (*20 %*). This is team evaluation. *Deadline: XX/XX, 11:59 pm.*

**** Late Work Will Not Be Accepted - Please Plan Accordingly ****

****Your scores for team assignments may change based on individual peer reviews****

GRADES

Item	Level	Proportion
Homework	Team	40 %
Final Projects	Team	30 %
Project Presentation	Team	10 %
Class Participation	Individual	20%

I'll convert your final point grade (*rounded into the nearest integer*) into a letter grade as follows:

Points	Grade
94 points or above	A
90 – 93	A-
87 – 89	B+
84 – 86	B
80 – 83	B-
77 – 79	C+
74 – 76	C

70 – 73	C-
60 – 69	D
below 60 points	F

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For a B: The student has demonstrated substantial knowledge of organizational theories and concepts; good presentation, leadership, analytical, research, and writing skills; and prepared participation in class.

For a C: The student has demonstrated acceptable but substandard knowledge of organizational theories and concepts; moderate presentation, leadership, analytical, research, and writing skills; and prepared participation in class.

For a D: The student has demonstrated poor knowledge of organizational theories and concepts; presentation, leadership, analytical, research, and writing skills; and participation in class. D is a failing grade for graduate students.

For an F: The student has demonstrated work that is unworthy of any credit.

If you feel that a grade is incorrect, notify me in writing (email qualifies) within one week of receiving the grade. Provide a rationale for your position. If you feel the issue is not resolved after considering my response, please contact me to schedule a Zoom/physical meeting.

MEASUREMENT OF LEARNING OBJECTIVES

The graded assignments for PM 510 are designed to assess various facets of students' virtual team development knowledge and leadership skills needed to work with various personalities and mental models in achieving team effectiveness. All students are required to complete the assignments described above. Each student's final grade for the course will depend upon the quality and quantity of work performed. Grades will be calculated as a weighted mean of the grades earned for each assignment described.

BRIGHTSPACE

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ACADEMIC INTEGRITY AND DISHONESTY

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ZOOM ETIQUETTE (GUEST SPEAKER SERIES)

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BINGHAMTON UNIVERSITY, STATE UNIVERSITY OF NEW YORK
SCHOOL OF MANAGEMENT
COURSE SYLLABUS

Course Number and Name: PM 520 Management of Strategic Human Capital

Credits: 2

Contact Hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name of Instructor: Dr. Shelley Dionne

Instructional Materials:

Books:

- ***Victory Through Organization*** *by Dave Ulrich, David Kryscynski, Wayne Brockbank, Mike Ulrich.*
- ***The HR Scorecard*** *by Brian Becker, Mark Huselid, Dave Ulrich*
- ***The Talent Delusion*** *by Tomas Chamorro-Premuzic*
- ***Work Rules!*** *by Laszlo Bock*

Podcasts (not necessarily free):

- ***Human Capital Leadership*** by HCI Podcast network
- ***Capital H*** by Deloitte
- ***The Indigo Podcast*** by Ben Baran and Chris Everett

Specific Course Information:

A critical source of competitive advantage often comes having the leadership skills necessary for composing, orchestrating and developing an organization's human capital. However, complex issues such as dynamic technology, demographic changes in the labor force, virtual work environments, and global business expectations (to name only a few) have increased the challenges of effectively managing a workforce. This course explores the human capital resource emergence process where the knowledge, skills and abilities (KSAs) of individuals are transformed and amplified into a valuable organizational resource. Specifically, we evaluate leadership behaviors that can enhance the success of an organization's human capital. This course has key themes: (1) Identifying critical aspects of the human capital resource emergence process, and (2) explore what leader behaviors and actions can impact elements of the social environment (i.e., how employees act, think and feel). By focusing on leader behavior development, the course prepares managers to handle the complexity of managing human assets successfully, in light of an increasingly complex work environment. Upon completion, participants will possess the key leader behaviors and skills that will help them achieve a productive and engaged workforce.

Course Prerequisite: PM 500 and PM 510

Course Objectives:

By the end of this course, participants should be able to:

- Identify key aspects of the human capital resource emergence process
- Discuss the impact of behavioral, cognitive and affective elements on human capital emergence
- Identify key leader behaviors and actions that provide greatest impact on human capital
- Identify key human resource practices that provide greatest impact on human capital
- Discuss barriers to effective leadership processes in uncertain environments

Brief List of Topics to Be Covered:

Week	Sessions	Topics Covered	Assignments
1	**Theme**	**Human Capital Resource Emergence (HCRE) Process**	

	Session 1a	• Introduction to Knowledge, Skills, Abilities
		  o Individual
		• HCRE Process
		• Transformation and Amplification
		  o Unit level Performance
			Leader Identification

	Session 1b	• Task Environment
		  o Task Interdependence
		• Social Environment
		  o Act, Think, Feel	

2	**Theme**	**Emergence Enabling Categories and Impacts on HCRE**	

	Session 2a	• Behavioral
		  o Coordination
		  o Communication
		  o Regulation
			HW1:
			Select one Emergence Enabling state and find a best practice example for each of the three key elements within the state (can be three unique and unrelated examples).

	Session 2b	• Cognitive
		  o Climate
		  o Memory
		  o Learning
		• Affective
		  o Cohesion
		  o Trust
		  o Positive emotions	

3	**Theme**	**COD Leadership Framework**	

	Session 3a	• Composing
		  o Strategic Direction
		  o Task Clarity
		  o Deployment
			HW2:
			Select one COD function and find a best practice example

			for each of the three key elements within the function (can be three unique and unrelated examples).
	Session 3b	• Orchestrating o Taskflow o Resources o Norms	
4	**Theme**	**Leadership Framework in Action**	
	Session 4a	• Developing o Learning Opportunities o Coaching & Feedback o Climate	**Final Project: Submit a leadership development plan showing how key elements of the COD leadership framework will impact key emergence enabling states.**
	Session 4b	• Project Closing and Lessons Learned • Steps to closing out a project • Post-project review • Professional development and certification paths	

COURSE ASSIGNMENTS

Individual Assignments

1. ***Homework*** (*40 %*). There are two homework assignments (20% for each).
   Deadlines: XX/XX & XX/XX, 11:59 pm.

2. ***Final Project*** (*30 %*).
   Deadline: XX/XX, 11:59 pm.

3. ***Class Participation*** (*30%*). You will be expected to contribute significantly to the class exercises and discussion.

****** Late Work Will Not Be Accepted - Please Plan Accordingly ******

******Your scores for team assignments may change based on individual peer reviews******

GRADES

Item	Level	Proportion
Homework	Individual	40 %
Final Projects	Individual	30 %
Class Participation	Individual	30%

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94 points or above	A
90 – 93	A-
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77 – 79	C+
74 – 76	C
70 – 73	C-
60 – 69	D
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For a D: The student has demonstrated poor knowledge of organizational theories and concepts; presentation, leadership, analytical, research, and writing skills; and participation in class. D is a failing grade for graduate students.

For an F: The student has demonstrated work that is unworthy of any credit.

If you feel that a grade is incorrect, notify me in writing (email qualifies) within one week of receiving the grade. Provide a rationale for your position. If you feel the issue is not resolved after considering my response, please contact me to schedule a Zoom/physical meeting.

MEASUREMENT OF LEARNING OBJECTIVES

The graded assignments for PM 520 are designed to assess various facets of students' human capital leadership knowledge and skills, as practiced, and developed throughout the course. All students are required to complete the assignments described above. Each student's final grade for the course will depend upon the quality and quantity of work performed. Grades will be calculated as a weighted mean of the grades earned for each assignment described.

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BINGHAMTON UNIVERSITY, STATE UNIVERSITY OF NEW YORK
SCHOOL OF MANAGEMENT
COURSE SYLLABUS

Course Number and Name: PM 530 Data Science for Project Management

Credits: 2

Contact Hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name of Instructor: Dr. Chou-Yu (Joey) Tsai

Instructional Materials:

Books:

- ***Data-Driven Project Management: A Statistical Approach to Project Success*** by Harold Kerzner: This book provides insights into using data analytics to improve project management outcomes and includes practical examples of how data-driven decision-making can reduce project risk and optimize performance.
- ***The Data Science Handbook*** by Field Cady: This book serves as an introduction to the fundamentals of data science, including key concepts such as data collection, processing, and model building, all of which are relevant for project management professionals.
- ***Storytelling with Data: A Data Visualization Guide for Business Professionals*** by Cole Nussbaumer Knaflic: A comprehensive guide to effective data visualization techniques, this book will help project managers present data insights in a way that stakeholders can easily understand.
- ***Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die*** by Eric Siegel: *This book delves into the world of predictive analytics and explains how businesses can use predictive models to anticipate outcomes, a skill applicable to managing project timelines and risks.*
- ***Hands-On Machine Learning with Scikit-Learn and TensorFlow*** by Aurélien Géron: *A practical guide to machine learning, this book will help you understand the algorithms and techniques used to build predictive models and optimize resources in projects.*

Podcasts:

- ***The Digital Project Manager Podcast*** by Ben Aston
- ***PM Point of View*** by Kendall Lott
- ***The AI Alignment Podcast*** by Lucas Perry
- ***Data Stories*** by Enrico Bertini and Moritz Stefaner**,**
- ***The Data Science & AI Weekly*** by Greg Coquillo

Online Resources:

- Kaggle
- Tableau Public
- Python

- Power BI
- R Snippets

Specific Course Information:

This course offers a thorough introduction to using data science in project management. It is aimed at project managers and professionals seeking to improve their decision-making abilities by leveraging data-driven methods. The course covers data metrics, crucial statistical techniques, key performance indicators (KPIs), machine learning, predictive modeling, and data visualization. By concentrating on practical tools and techniques, participants will discover how to analyze project data to gain insights, optimize resources, and effectively manage project performance. The course highlights real-world applications and evidence-based performance management to ensure successful project outcomes.

Course Prerequisites: PM 500 and PM 510

Course Objectives:

By the end of this course, participants should be able to:

- Identification of Key Performance Indicators for projects
- Basic statistical skills and knowledge
- Machine learning and predictive modeling
- Evidence-based performance management
- Interpreting data to provide useful and informative insights
- Optimization of resource allocation strategies
- Data visualization and presentation for stakeholders

Brief List of Topics to Be Covered:

Week	Sessions	Topics Covered	Assignments
1	**Theme**	**Introduction to Data Science and Key Performance Indicators (KPIs)**	
	Session 1a	• Overview of data science and its relevance to project management. • The role of data-driven decision-making in improving project outcomes. • Understanding project management metrics and their impact on success.	Team Assignment
	Session 1b	• Definition and selection of KPIs in project management. • Aligning KPIs with project goals and success criteria. • Introduction to data collection methods for monitoring KPIs.	
2	**Theme**	**Basic Statistical Techniques for Project Management**	
	Session 2a	• Overview of descriptive statistics (mean, median, mode, standard deviation).	**HW1: Create a project dashboard in**

		• Introduction to inferential statistics (hypothesis testing, confidence intervals). • Applying statistics to project management for decision-making.	**Tableau or Power BI using project data.**
	Session 2b	• Introduction to data visualization tools (e.g., Tableau, Excel, or R). • Best practices for creating visualizations that communicate project insights. • Using dashboards to track project progress and KPIs.	
3	**Theme**	**Machine Learning & Prediction**	
	Session 3a	• Overview of predictive analytics and its applications in project management. • Key predictive techniques • How to use predictive models to forecast project timelines and budgets.	**HW2:** **Build a simple predictive model using Python/R or Excel to forecast project completion times.**
	Session 3b	• Introduction to Predictive Analytics • Key Predictive Modeling Techniques • Using Predictive Models in Project Forecasting	
4	**Theme**	**Optimizing Resource Allocation through Data Science**	
	Session 4a	• Techniques for optimizing resource allocation using data. • Balancing time, cost, and scope with resource optimization strategies. • Introduction to optimization models and algorithms.	**Final Project:** Use an optimization tool or algorithm to balance project resources and improve project performance.
	Session 4b	• Using data to track and manage project performance in real time. • Implementing evidence-based approaches for continuous project improvement. • Communicating performance results to stakeholders effectively.	

Course Assignments

Team Assignments

1. ***Homework*** (*40 %*). There are two homework assignments (20% for each) for each team. ***Deadlines: XX/XX & XX/XX, 11:59 pm***.

2. ***Final Project*** (*30 %*).
   Deadline: XX/XX, 11:59 pm.

3. ***Project Presentations*** (*10%*). You will give a ***15-minute*** presentation of your project and

management plan at the final sessions. It is required to include every team member to participate in the presentation.

4. ***Class Participation*** (*20%*). You will be expected to contribute significantly to the class exercises and discussion.

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GRADES

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Homework	Team	40 %
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MEASUREMENT OF LEARNING OBJECTIVES

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BINGHAMTON UNIVERSITY, STATE UNIVERSITY OF NEW YORK
SCHOOL OF MANAGEMENT
COURSE SYLLABUS

Course Number and Names: PM 540 Introduction to Product Management

Credits: 2

Contact Hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name of Instructor: Dr. Chou-Yu (Joey) Tsai

Instructional Materials:

Books:

- ***Inspired: How To Create Products Customers Love*** by Marty Cagan: This book is a must-read for aspiring product managers. It focuses on how great product teams work and how successful products are built. It emphasizes the importance of understanding customers, the product development process, and building products people will love.
- ***Lean Product and Lean Analytics*** by Ben Yoskovitz and Alistair Croll: This book covers how to apply lean principles in product management to build successful products with minimal waste. It also emphasizes the importance of data and metrics to make informed decisions in product development.
- ***The Lean Product Playbook: How to Innovate with Minimum Viable Products and Rapid Customer Feedback*** by Dan Olsen: This is a practical guide to applying the lean startup methodology in product management. It teaches how to create MVPs (Minimum Viable Products), validate ideas with customer feedback, and iterate to build better products.
- ***Escaping the Build Trap: How Effective Product Management Creates Real Value*** by Melissa Perri: This book explains how product managers can focus on creating value rather than simply delivering features. It provides insights into developing a customer-focused strategy and improving the overall product management process.
- ***Hooked: How to Build Habit-Forming Products*** by Nir Eyal: This book explores how to create products that keep customers engaged through behavioral design and habit-forming techniques. It's particularly useful for product managers aiming to build products that customers use regularly.

Podcasts:

- ***The Product Podcast*** by Product School
- ***This is Product Management*** by Alpha
- ***Rocketship.fm*** by Michael Sacca, Joelle Steiniger, and Matt Goldman
- ***The Product Experience*** by Mind the Product**,**
- ***Build*** by Perri Blake Gorman

Online Resources:

- Product School
- Mind the Product
- ProductPlan
- Roman Pichler's Product Management Blog
- Aha! Blog

Specific Course Information:

This course offers a comprehensive introduction to the fundamental principles of product management. It focuses on the entire product lifecycle and the necessary skills for creating successful products. Participants will learn to identify and address product challenges, interact with customers to grasp their needs, and integrate feedback into the development process. The course highlights a user-centric design approach for building intuitive products and teaches how to establish and oversee effective product roadmaps. Upon completing the course, students will be prepared to ensure product-market fit and guide products to long-term success in competitive markets.

Course Prerequisites: PM 500

Course Objectives:

By the end of this course, participants should be able to:

- Identify and explore solutions for complex product problems, leveraging creative and data-driven approaches.
- Understand customer needs, manage customer engagement, and incorporate feedback to enhance product development.
- Apply user-centric design principles to create simple, intuitive, and effective product experiences.
- Demonstrate knowledge of the complete product lifecycle, from ideation to product launch and iteration.
- Build and communicate a clear product roadmap, aligning it with business goals and stakeholder expectations.
- Evaluate and achieve product-market fit by analyzing customer feedback and market conditions to ensure long-term product success.

Brief List of Topics to Be Covered:

Week	Sessions	Topics Covered	Assignments
1	**Theme**	**Fundamentals of Product Management & Problem Identification**	
	Session 1a	• Introduction to Product Management: Roles and Responsibilities • Overview of product management and its importance in modern businesses. • Key roles and responsibilities of a product manager. • The product lifecycle and how it shapes product management.	Team Assignment
	Session 1b	• Identifying Problems and Exploring Solutions • Methods for identifying and analyzing product problems.	

		• Exploring creative and data-driven approaches to problem-solving. • Prioritizing product problems and aligning them with business goals.	
2	**Theme**	**Understanding Customer Needs & Feedback Management**	
	Session 2a	• Customer needs and engagement • Understanding customer behavior and pain points. • Techniques for gathering customer insights (interviews, surveys, user testing). • Building and maintaining customer engagement throughout the product lifecycle.	**HW1: Conduct a product problem identification exercise using a case study.**
	Session 2b	• Managing customer feedback for product development • Incorporating customer feedback into product development. • Methods for managing and prioritizing customer feedback. • Balancing customer demands with business goals.	
3	**Theme**	**User-Centric Design & Building the Product Roadmap**	
	Session 3a	• Designing products with a user-centric approach • Principles of user-centered design and its importance in product development. • Simplifying product features to create a better user experience. • Techniques for creating wireframes and prototypes for testing product concepts.	**HW2: Develop a product roadmap for a sample product, including key milestones and priorities.**
	Session 3b	• Building a product roadmap • Introduction to product roadmaps and their role in product planning. • Defining key milestones, setting priorities, and aligning roadmaps with business goals. • Managing product roadmaps in agile environments.	
4	**Theme**	**Achieving Product-Market Fit & Measuring Success**	
	Session 4a	• Product-market fit: finding the right market for your product • Defining product-market fit and its importance in product success. • Techniques for analyzing market trends and assessing competitive landscapes. • Iterating on the product to better meet market demands.	**Final Project:** Define KPIs for a product and create a plan for using data analytics to measure and improve product performance.
	Session 4b	• Measuring product success & continuous improvement • Identifying key performance indicators (KPIs) to measure product success.	

		• Using analytics tools to gather data on product performance. • Continuous improvement through iteration and feedback loops.	

Course Assignment:

Team Assignments

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2. *Final Project* (*30 %*). *Deadline: XX/XX, 11:59 pm.*

3. *Project Presentations* (*10%*). You will give a *15-minute* presentation of your project and management plan at the final sessions. It is required to include every team member to participate in the presentation.

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MEASUREMENT OF LEARNING OBJECTIVES

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BINGHAMTON UNIVERSITY, STATE UNIVERSITY OF NEW YORK
SCHOOL OF MANAGEMENT
COURSE SYLLABUS

Course Number and Name: PM 550 Creativity Process & Innovation Implementation

Credits: 2

Contact Hours: 6.25 hours of instruction per week (This is a 4-week online course. For each credit hour, students will receive 3.125 hours of instruction per week). Office hours will be performed through zoom between 4:00pm-5:00pm every Thursday or by appointment.

Name of Instructor: Dr. Shelley Dionne

Instructional Materials:

Books:

- Bohm, David. *On Creativity*. New York: Routledge. 1996.
- Burger, Edward B. and Michael Starbird. *The 5 Elements of Effective Thinking*. Princeton, NJ: Princeton University Press, 2012.
- Leski, Kyna. *The Storm of Creativity*, MIT Press, 2015.
- Root-Bernstein, Robert and Michele. *Sparks of Genius: The Thirteen Thinking Tools of the World's Most Creative People*. New York: Houghton Mifflin Co., 1999.
- Tharp, Twyla. The Creative Habit: *Learn it and Use it for Life*. New York: Simon & Schuster, 2003.
- Wolff, J. *Creativity Now: Get inspired, create ideas and make them happen!* Financial Times Prentice Hall, 2012.

Video:

- "Massimo Bottura | Talks at Google," at https://www.youtube.com/watch?v=hFkNx2UQGNQ.
- A powerful way to unleash your natural creativity by Tim Harford at https://www.youtube.com/watch?v=fxbCHn6gE3U
- How to be Creative on Demand by Harvard Business Review at https://www.youtube.com/watch?v=ou2tuZhk5VQ
- Steal Like an Artist by Austin Kleon at https://www.youtube.com/watch?v=oww7oB9rjgw

Specific Course Information:

An organization accepting the status quo as excellence is likely an organization in decline. No matter the profession or organization, employees and leaders that seek new ways to solve old problems, or new ways to think about new problems likely has a significant competitive advantage over organizations that do not encourage innovation. This syllabus outlines a course designed to help students identify, cultivate, and engage their creative and innovative potential, and then encourage others in the organization to do the same. The course is structured into two parts. First, students explore a problem-solving perspective: appropriate problem identification, innovative iteration, the value of feedback, and engaging in a decision-making process to minimize failure. In the second phase, students shift their focus to learning how to lead others in the innovation process, particularly through transformational leadership, and in particular, intellectual stimulation. This phase explores how to encourage teams to develop innovative solutions to address identified problems and how to build a culture that supports and values the learning process, including failure. By focusing on leader behavior development, the course prepares managers to embrace a dynamic market environment where innovation is a critical success factor. Upon completion, participants will possess the key leader behaviors and skills that will help them achieve an innovative and engaged workforce.

Course Prerequisites: PM 510

Course Objectives:

By the end of this course, participants should be able to:

- Identify key aspects of the problem-solving and creative process linked to innovation
- Identify appropriate problems to address, and engage in an innovation process to generate solutions
- Identify key leader behaviors and actions that provide greatest impact on innovation
- Develop critical feedback skills, particularly surrounding innovation and creativity
- Discuss barriers to effective leadership processes in dynamic environments

Brief List of Topics to Be Covered:

Week	Sessions	Topics Covered	Assignments
1	**Theme**	**The Problem-Solving and Creativity Process**	

	Session 1a	• Introduction to Knowledge, Skills, Abilities
		  o Individual
		• HCRE Process
		• Transformation and Amplification
		  o Unit level Performance	

	Session 1b	• Task Environment
		  o Task Interdependence
		• Social Environment
		  o Act, Think, Feel
			HW1: Identify an important social problem to be solved, and work with a partner/champion to incorporate their feedback into your ideation. Suggest at least two ways to solve the problem, and through the feedback and ideation process, decide on which solution is best and explain why that solution was selected.

2	**Theme**	**Providing Feedback: Problem Solving and Innovation**	
	Session 2a	• Presentations on Social Entrepreneurial Solutions	**HW2: Partner/champion a classmate and provide iterative feedback on their problem identification and innovative iterations.**

			The quality of your feedback will be evaluated.
	Session 2b	• Presentations on Social Entrepreneurial Solutions	
3	**Theme**	**Transformational Leadership Framework**	
	Session 3a	• Intellectual Stimulatoin o Problem Solving o Climate Development o Role Model	**HW3:** **Select one team member's solution to implement into a community. Identify critical factors in the implementation and decision making process related to the roll-out of the idea. Include a discussion of the organizational structure and leadership structure.**
	Session 3b	• Shared Leadership o Task-based Conflict o Diversity of thought o Inviting feedback	
4	**Theme**	**Practicing Leadership: Building an Intellectually Stimulated Environment**	
	Session 4a	• Team Presentations	**Final Evaluation: Submit a leadership evaluation of the team's performance.**
	Session 4b	• Peer-based leadership feedback and evaluation • Peer-based climate evaluation • Discussion of process improvement	

Course Assignments

Individual and Team Assignments

1. *Individual Homework* (*40 %*). There are two homework assignments (20% for each).
   Deadlines: XX/XX & XX/XX, 11:59 pm.

2. *Presentations (50%).* There are two presentations, one individual and one team presentation (25% each).

3. *Final Evaluation* (*10 %*). This is team evaluation.
   Deadline: XX/XX, 11:59 pm.

**** Late Work Will Not Be Accepted - Please Plan Accordingly ****

****Your scores for team assignments may change based on individual peer reviews****

GRADES

Item	Level	Proportion
Homework	Individual	40 %
Presentations	Individual and Team	50 %
Final Evaluation	Team	100%

I'll convert your final point grade (*rounded into the nearest integer*) into a letter grade as follows:

Points	Grade
94 points or above	A
90 – 93	A-
87 – 89	B+
84 – 86	B
80 – 83	B-
77 – 79	C+
74 – 76	C
70 – 73	C-
60 – 69	D
below 60 points	F

The following grading system applies to graduate students:

For an A: The student has demonstrated exceptional achievement including knowledge of organizational theories and concepts; good presentation, leadership, analytical, research, and writing skills; and active, and prepared participation in class.

For a B: The student has demonstrated substantial knowledge of organizational theories and concepts; good presentation, leadership, analytical, research, and writing skills; and prepared participation in class.

For a C: The student has demonstrated acceptable but substandard knowledge of organizational theories and concepts; moderate presentation, leadership, analytical, research, and writing skills; and prepared participation in class.

For a D: The student has demonstrated poor knowledge of organizational theories and concepts; presentation, leadership, analytical, research, and writing skills; and participation in class. D is a failing grade for graduate students.

For an F: The student has demonstrated work that is unworthy of any credit.

If you feel that a grade is incorrect, notify me in writing (email qualifies) within one week of receiving the grade. Provide a rationale for your position. If you feel the issue is not resolved after considering my response, please contact me to schedule a Zoom/physical meeting.

MEASUREMENT OF LEARNING OBJECTIVES

The graded assignments for PM 550 are designed to assess various facets of students' creative process knowledge and leadership skills needed to implement innovation, as practiced, and developed throughout the course. All students are required to complete the assignments described above. Each student's final grade for the course will depend upon the quality and quantity of work performed. Grades will be calculated as a weighted mean of the grades earned for each assignment described.

BRIGHTSPACE

We will use Brightspace for posting materials and distributing notices to class members. The instructor reserves the right to modify any or all of the contents of this syllabus to better meet the needs of the college and its students. Please note that all changes will be documented on Brightspace.

ACADEMIC INTEGRITY AND DISHONESTY

All students are expected to adhere to the Binghamton University Code of Student Conduct. Binghamton University expects everyone to operate at the highest levels of academic integrity. The *Official Student Handbook* and other documents make the policies and procedures on this issue clear. You will receive a score of zero for the first instance of academic dishonesty in this course. The penalty for the second offense is a failing grade in the course. Beyond cheating, plagiarism (i.e., quoting or paraphrasing passages from other sources and then placing them in your writings/papers without referencing the original source) is also considered to be academic dishonesty and cheating in this course.

ZOOM ETIQUETTE (GUEST SPEAKER SERIES)

If camera access is possible, students are expected to turn their cameras on during Zoom meetings and keep their mics muted unless they speak. Their Zoom screen names must be their full names. You are welcome to use an appropriate virtual background if you wish.

External Instruction Form

Form 2E

Version 2014-11-17

This form is required when external instruction is part of the degree requirements in an academic program. External instruction includes internships, field work, clinical placements, cooperative education, service learning, and the like, which are offered in cooperation with external partners, such as business and industry, health care facilities, public agencies, or schools.

1. Use the table below (expanded as necessary) to summarize proposed arrangements for required external instruction in an academic program. List all proposed arrangements. The number of placements listed below should equal or exceed the number of students expected to be in the initial cohort of a new program.

Name and Title of Contact Person	Name and Address of Placement Site	# of placements per year
Yan Zhang, Interim Executive Director	National Corn-to-Ethanol Research Center (NCERC), 400 University Park Drive, Edwardsville, IL 62025	25

An example schedule for a week-long, on-site training

Day	Training	Milestone
1	Plant and lab safety, GMP- and GLP-like data recording, feedstock characterization, DOE 1 billion Ton report on feedstocks, feedstock milling, and particle size analysis	Trained to be ready to work in an industrial biomanufacturing environment and can connect feedstocks with biofuels and bioproducts
2	Pretreatment and enzymatic hydrolysis – 1L and 10 L with various running conditions, mass, and energy balance calculation, different feedstock challenges, QC, etc.	Gain hands-on experience on the challenges of making biofuels and bioproducts under green chemistry conditions, and how to quantify the challenge.
3	Fermentation, flask level, media preparation, culture propagation, anaerobic on yeast, fermentation kinetics, intermediate and final product characterization	Gain hands-on experience in yeast fermentation to make biofuels.
4	5 L aerobic *E. coli* fermentation, and intermediate and final product characterization	Gain hands-on experience with bacteria fermentation to make a monomer for building a polymer
5	Data harvesting, interpretation, troubleshooting, reporting, and Q/A about the week-long training	Design and run a mock biomanufacturing process, and present it to the team
6	Visit and shadow at a commercial biofuel plant.	Learn the history of the bioethanol industry and about a typical day running the biorefinery.

2. For clinical placements for programs leading to professional licensure in a health profession, **append** documentation to demonstrate each site's commitment to a numerical range of students each year, and the time period of its commitment. The documentation should be signed by the responsible official at each proposed clinical site.

3. In the table below, list the individual(s) at the campus (or at each campus, in the case of multi-institution programs) who will have responsibility for oversight and administration of external instruction.

Name	Title	Email Address
Kaiming Ye	SUNY Distinguished Professor, Chair, Department of Biomedical Engineering	kye@binghamton.edu
Colin Walsh	Program Coordinator	cwalsh10@binghamton.edu

Distance Education Format Proposal
For A Proposed or Registered Program

Form 4

Version 2016-10-18

When a new or existing program is designed for a distance education format, a campus Chief Executive Officer or Chief Academic Officer should submit a signed cover letter and this completed form to the SUNY Provost at *program.review@suny.edu*. According to MSCHE, the 50% standard includes only courses offered in their entirety via distance education, not courses utilizing mixed delivery methods. Also, MSCHE requires that the first two programs for which 50% or more is offered through distance education be submitted for Commission review and prior approval of a substantive change.

- All campuses must complete the following sections: Sections 1 - 3, and Part B: Program Specific Issues.
- Part A must be completed if the proposing campus has not previously submitted this form with a completed Part A: Institution-wide Issues, or has made significant changes to its institution-wide distance education operations since last completing Part A. This applies even if the institution has programs registered to be delivered at a distance.

Section 1. General Information		
a) Institutional Information	Institution's 6-digit SED Code:	**211000**
	Institution's Name:	Binghamton University (State University of New York at Binghamton)
	Address:	4400 Vestal Parkway East, Binghamton, NY 13901
b) Registered or Proposed Program	Program Title:	Biomanufacturing Project Management
	SED Program Code	
	Award(s) (e.g., A.A., B.S.):	Advanced Certificate
	Number of Required Credits:	Minimum [16] If tracks or options, largest minimum [ ]
	HEGIS Code:	0905.00
	CIP 2010 Code:	14.0501
c) Distance Education Contact	Name and title: Donald E. Hall, Provost and Executive Vice President for Academic Affairs Telephone: 607-777-2141 E-mail: dehall@binghamton.edu	
d) Chief Executive or Chief Academic Officer Approval	**Signature affirms that the proposal has met all applicable campus administrative and shared governance procedures for consultation, and the institution's commitment to support the proposed program. *E-signatures are acceptable.*** Name and title: Donald E. Hall, Provost and Executive Vice President for Academic Affairs Signature and date:	
	If the program will be registered jointly[1] with one or more other institutions, provide the following information for each institution:	
	Partner institution's name and 6-digit SED Code: Name, title, and signature of partner institution's CEO (or **append** a signed letter indicating approval of this proposal):	

[1] If the partner institution is non-degree-granting, see SED's CEO Memo 94-04.

Section 2: Enrollment

Year	Anticipated Headcount Enrollment			Estimated FTE
	Full-time	Part-time	Total	
1	25	N/A	25	25
2	30	N/A	30	30
3	35	N/A	35	35
4	40	N/A	40	40
5	50	N/A	50	50

Section 3: Program Information

a) ***Term length*** (in weeks) for the distance program: 24 weeks

b) Is this the same as term length for classroom program? [X] No [ ] Yes [ ] N/A

This advanced certificate program is offered online. Additionally, students have the option to participate in a one-week on-site training session.

c) How much "***instructional time***" is required per week per credit for a distance course in this program? (Do not include time spent on activities that would be done outside "class time," such as research, writing assignments, or chat rooms.) ***NOTE:*** *See SUNY policy on credit/contact hours and SED guidance.*

For each two-credit hour, 4-week course, students will receive 6.25 hours of instruction per week. For each two-credit hour, 8-week course, students will receive 3.125 hours of instruction per week.

d) What proportion or percentage of the program will be offered in Distance Education format? Will students be able to complete 100 percent of the program online? If not, what proportion will be able to be completed online?

a) 100% of the program will be offered in the Distance Education format. 100% of the program will be able to be completed online. Students have the option to participate in a one-week on-site training session.

b) What is the maximum number of students who would be enrolled in an online course section?

The maximum number of enrolled students will vary depending upon the course and available resources. We expect that 25 would be the maximum number of students who would be enrolled in the first class when we launch the program. This number was determined by the funding that we received from BioMADE. The enrollment will grow over the year when the program becomes more mature. We expect the enrollment to be 30 students in the second year, 35 students in the third year, 40 students in the fourth year, and 50 students in the fifth year.

Part A: Institution-wide Issues: Submit Part A only for the **first** Distance Education program proposed by your institution using this form. SUNY and the State Education Department will keep this in a master file so that your institution will not need to resubmit it for each new proposed online program, **unless there are significant changes, such as a new platform**.

Part A.1. Organizational Commitment

a) Describe your institution's planning process for Distance Education, including how the need for distance access was identified, the nature and size of the intended audiences, and the provisions for serving those audiences, including how each student's identity will be verified.

b) Describe your institution's resources for distance learning programs and its student and technical support services to ensure their effectiveness. What course management system does your institution use?

c) Describe how the institution trains faculty and supports them in developing and teaching online courses, including the pedagogical and communication strategies to function effectively. Describe the qualifications of those who train and/or assist faculty, or are otherwise responsible for online education.

d) If your institution uses courses or academic support services from ***another provider***, describe the process used (with faculty participation) to evaluate their quality, academic rigor, and suitability for the award of college credit and a degree or certificate.

e) Does your institution have a clear ***policy on ownership of course materials*** developed for its distance education courses? How is this policy shared with faculty and staff? ***NOTE:*** *You may refer to SUNY's statement on copyright and faculty ownership of instructional content, and/or faculty contract provisions.*

Part A.2. Learner Support

a) Describe how your institution provides distance students with ***clear information*** on:

- Program completion requirements
- The nature of the learning experience
- Any specific student background, knowledge, or technical skills needed
- Expectations of student participation and learning
- The nature of interactions among faculty and students in the courses.
- Any technical equipment or software required or recommended.

b) Describe how your institution provides distance learners with adequate ***academic and administrative support***, including academic advisement, technical support, library and information services, and other student support services normally available on campus. Do program materials clearly define how students can access these support services?

c) Describe how ***administrative processes*** such as admissions and registration are made available to distance students, and how program materials inform students how to access these services.

d) What ***orientation*** opportunities and resources are available for students of distance learning?

Part B: Program-Specific Issues: Submit Part B for each new request to add Distance Education Format to a proposed or registered program.

Part B.1. Learning Design

a) How does your institution ensure that the ***same academic standards and requirements*** are applied to the program on campus and through distance learning? If the curriculum in the Distance Education program differs from that of the on-ground program, please identify the differences.

Lectures will be recorded live on-campus and digitally captured using Panopto or Camtasia. The recorded lectures will be posted to a course management system (Brightspace). Course materials, including lecture notes, will be posted to Brightspace. Students enrolled in a distance learning section will need to meet course deadlines for assignments and exams, just as on-campus students would. The instructors will use the same set of standards that they would use if they were teaching an on-campus section of a course.

b) Are the courses that make up the distance learning program offered in a sequence or configuration that allows ***timely completion of requirements***?

Courses are designed and will be taught in a sequence, allowing students to complete the advanced certificate program within 24 weeks.

c) How do faculty and others ensure that ***the technological tools*** used in the program are appropriate for the content and intended learning outcomes?

Binghamton University's Center for Learning and Teaching will provide support to faculty and instructors and the departments systematically monitor student feedback and address any issues that arise.

d) How does the program provide for appropriate and flexible interaction between faculty and students, and among students?

The program will use several strategies to promote student connectivity and engagement. Academic advisement will be conducted via emails, teleconference meetings, and/or Zoom meetings. The University's Learning Management System (Brightspace) will continue to provide blogs and discussion boards that facilitate discussions and exercises among the online students.

e) How do faculty teaching online courses verify that the student who registers in a distance education course or program is the same student who participates in and completes the course or program and receives the academic credit?

Each student is assigned a unique sign-in and password for access to our University's Learning Management System. Binghamton University's Center for Learning and Teaching vetted a series of online verification software packages for the university. These measures would be used in addition to the University's standard authentication processes.

Part B.2. Outcomes and Assessment

a) Distance learning programs are expected to produce the ***same learning outcomes*** as comparable classroom-based programs. How are these learning outcomes identified – in terms of knowledge, skills, or credentials – in course and program materials?

The learning outcomes for every course will be identified on the course syllabus. The learning outcomes for each program will be identified in the University Academic Guide and on program webpages. There are no on-campus students, but they would receive the same syllabus as the online students. As a result, both on-campus and online students would be expected to achieve the same learning outcomes.

Per the New York State Education Department's (NYSED) guidelines, all course syllabi will include:

- Course description
- Course objectives
- Course prerequisites
- Credits allocated
- Assignments
- Method(s) of assessing student achievement, including the assessment rubrics at the course and project levels
- Basis of grade determination
- Bibliographic and other resources
- Other course policies related to integrity of credit

Additionally, also per the NYSED guidelines: "syllabi demonstrate that at the course level the requirements for expected time on task meet the requirements" described in Section 3, part c of this document, "that all work for

credit is college-level, of the appropriate rigor, and that credit will be granted only to students who have achieved stated learning objectives."

b) Describe how the ***means chosen for assessing student learning*** in this program are appropriate to the content, learning design, technologies, and characteristics of the learners.

Students will be assessed in each course using exams, assignments, and/or projects and all assessments will be identified in the course syllabus, as stated in Part B.2. question a of this document.

Each course in the program has course objectives, as identified on the course syllabus, and the assessments are developed in relation to those course objectives.

It is left to the discretion of the course instructor to select the assessments that best demonstrate that students have met their course objectives. It is left to the discretion of the course instructor as to how to administer exams to online students.

All course instructors will make course assessments available to all students in their courses without regard to an individual student's race, color, national origin, religion, creed, age, disability, sex, gender identity or expression, sexual orientation, familial status, pregnancy, predisposing genetic characteristics, military status, or domestic violence victim status, with appropriate accommodations.

Part B.3. Program Evaluation

a) What process is in place to monitor and ***evaluate the effectiveness*** of this particular distance education program on a regular basis?

Program learning objectives and student learning outcomes will be assessed through evaluation measures used in courses, including assignments, exams, etc. Faculty meet annually to review assessment results and make appropriate changes to the curriculum based on the data with the overall goal of improving student learning.

In addition, the program has an Industrial Advisory Board comprised of industry representatives and alumni. This board meets annually to provide input to program objectives and curriculum.

A joint effort between the Thomas J. Watson College's Career and Alumni Connections Office and the University's Office of Student Affairs Assessment and Strategic Initiatives gathers data annually from students who complete programs to gauge their long-term success.

b) How will the evaluation results will be used for ***continuous program improvement***?

The BPM advanced certificate program will conduct end-of-the-term course reviews with the faculty after the completion of the term, in accordance with the general Middle States assessment process. During those reviews, the student outcomes for the courses will be measured, the overall scores will be determined, problems/issues will be identified, and solutions will be proposed to address the problems/issues. We will reassess the program after any changes are implemented; the process will be continuous.

c) How will the evaluation process assure that the ***program results in learning outcomes appropriate to the rigor and breadth*** of the college degree or certificate awarded?

The evaluation process for the online format will be the same as that for our on-campus programs. The department-level evaluation process of the Learning Goals, Learning Outcomes, and Measures for the program will take place annually and includes inputs from faculty, students, industry representatives, and program alumni. These constituents will provide feedback from an academic and an industrial point of view. This will allow the

department to adjust its goals, outcomes, and measures in ways to provide both academic rigor and industrial practicality to its program.

Part B.4. Students Residing Outside New York State

SUNY programs must comply with all "authorization to operate" regulations that are in place in other U.S. states where the institution has enrolled students or is otherwise active, based on each state's definitions.

a) What processes are in place to monitor the U.S. state of residency of students enrolled in any distance education course in this program while residing in their home state?

Residency status of each student is initially established based on admissions data. Students may apply through the Office of Student Accounts to change their residency status. Residency classification is determined by a review of all of the information provided on the admissions application in accordance with guidelines provided by SUNY's Residency Policy.

b) Federal regulations require institutions delivering courses by distance education to provide students or prospective students with contact information for filing complaints with the state approval or licensing entity in the student's state of residency and any other relevant state official or agency that would appropriately handle a student's complaint. What is the URL on your institution's website where contact information for filing complaints for students in this program is posted? ***NOTE:*** *Links to information for other states can be found at here.*

https://www.binghamton.edu/academics/winter/info.html

Rubric for Diversity Statements for New Program Review

Proposal – Biomanufacturing Project Management Advanced Certificate Program, Department of Biomedical Engineering, February 3rd, 2025

Reviewer reactions

	This rubric is provided as a guideline in reviewing and evaluating diversity statements in new program proposals	OK	Needs more work	Not sure Need more information	NA	Comments
	Students:					
1	The proposal presents a clear picture of the diversity of:					
	Students in related programs at BU	X				
	The occupation or discipline as a whole	X				
	The expected student body in the proposed program	X				
	Note: diversity may include groups historically under-represented, proportions of women and minority group members and students for whom English is a second language	X				
2	The proposal describes specific plans to recruit students identified as underrepresented in the analysis above.	X				
	Note: examples may include targeted recruiting venues and strategies, establishment of “pipelines”, targeted scholarships and working with organizations representing underrepresented individuals in colleges or professional settings.					
3	The proposal describes procedures in place to retain students from diverse backgrounds and ensure their success. Are these procedures currently in place or being developed?	X				
	Note: The Division of Diversity, Equity and Inclusion and the University Educational Institute may be able to help with the development of these procedures.					

		OK	Needs more work	Not sure Need more information	NA	Comments
	Faculty and hiring:					
4	The proposal describes the diversity of current faculty of the unit or who will be teaching in the program.	X				
5	The proposal describes specific plans to recruit faculty from groups identified as underrepresented.				X	
	Note: Description of recruiting practices may include how the positions will be advertised and how candidates from underrepresented groups can be added to the pool.					
6	The proposal describes specific practices and procedures in place to ensure success and retention of faculty from underrepresented groups.				X	
	Note: This might include specific mentoring practices and faculty development programs.					