
THOMAS J. WATSON SCHOOL OF ENGINEERING AND APPLIED SCIENCE

FACULTY

*Year of initial appointment at Binghamton

Abu-Ghazaleh, Nael, *Assistant Professor*, Computer Science Department, PhD, 1997, University of Cincinnati: Parallel computer architectures. (1998)

Aggarwal, Sudhir, *Professor and Chair*, Computer Science Department, PhD, 1975, University of Michigan: Parallel and distributed systems, software engineering, design and analysis of protocols, modeling and simulation, computer networks, databases. (1990)*

Bergman, Craig, *Lecturer*, Electrical Engineering Department, MS, 1975, University of Illinois: Human factors, digital design, microprocessors. (1985)

Bourbakis, Nikolaos, *Professor*, Electrical Engineering Department, PhD, 1983, University of Patras: Artificial intelligence, machine vision, robotics, knowledge-based VLSI design. (1991)

Cardullo, Frank, *Associate Professor*, Mechanical Engineering Department, MS, 1972, State University of New York at Binghamton: Vehicle simulation, vehicle dynamics, man-machine systems. (1980)

Chatterjee, Monish, *Associate Professor*, Electrical Engineering Department, PhD, 1985, University of Iowa: Nonlinear wave phenomena, nonlinear modeling, quantum electronics, acousto-optics, fiber optics and optical communications. (1986)

Constable, James H., *Professor*, Electrical Engineering Department, Registered Professional Engineer, PhD, 1969, Ohio State University: Instrumentation, contact resistance, electrical noise, electronics packaging. (1974)

Culver, Richard, *Professor*, Mechanical Engineering Department and *Director*, *Division of Engineering Design*, Registered Professional Engineer, PhD, 1964, Cambridge University: Dynamic instabilities in metal deformation, engineering education. (1984)

Cutler, Michal, *Associate Professor*, Computer Science Department, PhD, 1979, Weizmann Institute, Israel: Parallel computation, design of algorithms, design automation, information retrieval, expert systems. (1983)

Delgado-Frias, José, *Associate Professor*, Electrical Engineering Department, PhD, 1986, Texas A&M University: Computer engineering, VLSI/WSI design, parallel computer architectures. (1989)

Eckert, Richard, *Associate Professor*, Computer Science Department, PhD, 1971, University of Kansas: Computer science education, computer graphics, computer architecture, microprocessor-based systems. (1983)

Emerson, C. Robert, *Professor and Chair*, Systems Science and Industrial Engineering Department, PhD, 1970, Purdue University: Integrated manufacturing, quality assurance, decision support systems. (1986)

Enke, David, *Assistant Professor*, Systems Science and Industrial Engineering Department, PhD, 1997, University of Missouri-Rolla: Neural networks, artificial vision, optimization, applied statistics, decision support systems, cognitive modeling. (1999)

Fang, Jiayuan, *Associate Professor*, Electrical Engineering Department, PhD, 1989, University of California at Berkeley: Computational electromagnetics, electronic packaging and interconnects, microwaves. (1990)

Feisel, Lyle, *Professor*, Electrical Engineering Department, and *Dean of the Thomas J. Watson School of Engineering and Applied Science*, PhD, 1964, Iowa State University: Physical electronics, thin films, semiconductors, continuing education. (1983)

Fellows, Sharon, *Lecturer*, Division of Engineering Design, MA, 1986, Goddard College, MS, 1983, University of Maine: Rhetoric, teaching, and writing curriculum development. (1995)

Fillo, John, *Professor*, Mechanical Engineering Department, *Associate Dean for Research and External Affairs*, PhD, 1965, Syracuse University: Thermal fluid analysis, mathematical modeling, heat transfer in electronics, advanced technology. (1984)

Foreman, Dennis, *Lecturer*, Computer Science Department, MS, 1973, State University of New York at Binghamton: Design and development of operating systems and computers. (1994)

- Gause, Donald C., *Professor Emeritus and Bartle Professor*, Systems Science and Industrial Engineering Department, MS, 1957, Michigan State University: Generic design processes, user-oriented systems design, problem resolution processes, adaptive programming. (1967)
- Geer, James F., *Professor Emeritus and Bartle Professor*, Systems Science and Industrial Engineering Department and Harpur College Mathematical Sciences Department, PhD, 1967, New York University: Nonlinear boundary-value problems, perturbation methods, symbolic computation. (1969)
- Ghose, Kanad, *Associate Professor*, Computer Science Department, PhD, 1988, Iowa State University: Parallel processing, computer architecture, VLSI architectures, distributed systems, operating systems. (1987)
- Goel, Narendra S., *Professor Emeritus*, Systems Science and Industrial Engineering and Computer Science Departments, PhD, 1965, University of Maryland: Quantitative modeling of biological, social, physical, and engineering systems, morphogenesis and aging, protein folding, computer simulation, computer graphics, remote sensing of vegetation. (1975)
- Guydosh, Nicholas, *Lecturer*, Computer Science Department, PhD, 1968, Syracuse University: Computer architecture, formal languages, theory of computation, logic design, parallel and distributed computing, computer science education. (1991)
- Head, Eileen, *Lecturer*, Computer Science Department, MS, 1974, University of Texas at El Paso: Programming languages, algorithms, design patterns. (1994)
- Iwobi, Margaret E., *Lecturer and Program Coordinator*, Computer Science Department, MS, 1975, State University of New York at Binghamton: Software engineering principles, computer science education, development of programming principles and practices, software development environments. (1975)
- Klir, George J., *Distinguished Professor*, Systems Science and Industrial Engineering Department, PhD, 1964, Czechoslovak Academy of Sciences: General systems methodology, information theory, expert systems, intelligent and fuzzy systems, fuzzy measure theory. (1969)
- Kroger, Harry, *Professor*, Electrical Engineering Department, PhD, 1962, Cornell University: Electronics packaging, physics and fabrication of superconductor and semiconductor devices, superconductor-semiconductor hybrid circuits. (1992)
- Land, Walker, *Lecturer*, Computer Science Department, MS, 1964, George Washington University: Evolutionary computing, neural networks, genetic optimization, simulated annealing, object application of object-oriented paradigm to system software development. (1994)
- Lander, Les, *Associate Professor*, Computer Science Department, PhD, 1973, University of Liverpool, England: Ada programming language, alternative programming (LISP, PROLOG, object-oriented), expert systems, formal aspects of software engineering. (1985)
- Lehmann, Gary, *Associate Professor*, Mechanical Engineering Department, PhD, 1986, Clarkson University: Fluid dynamics, numerical and experimental heat transfer cooling of electronics. (1985)
- Lewis, Harold W. III, *Associate Professor*, Systems Science and Industrial Engineering, PhD, 1995, State University of New York at Binghamton: Fuzzy expert systems, approximate reasoning. (1998)
- Lowen, Walter, *Professor Emeritus*, Systems Science and Industrial Engineering Department, DSc, 1963, Eidgenössische Technische Hochschule, Zurich: Cognitive models, human factors, visual perception, systems design and systems modeling, artificial intelligence. (1967)
- Madden, Patrick, *Assistant Professor*, Computer Science Department, PhD, 1998, University of California at Los Angeles: Computer architecture and VLSI CAD. (1998)
- Meng, Weiyi, *Associate Professor*, Computer Science Department, PhD, 1992, University of Illinois at Chicago: Heterogeneous database systems, query optimization and translation, information retrieval. (1992)
- Miles, Ronald, *Professor and Chair*, Mechanical Engineering Department, PhD, 1987, University of Washington: Vibrations, acoustics, mechatronics, bioacoustics. (1989)
- Morris, James, *Professor*, Electrical Engineering Department, PhD, 1971, University of Saskatchewan, Registered Professional Engineer: Thin films, semiconductor devices, electronics packaging, sensors, engine control. (1984)
- Murray, Bruce, *Assistant Professor*, Mechanical Engineering Department, PhD, 1986, University of Arizona: Thermal and fluid sciences, computational fluid dynamics, materials processing. (1997)
- Pattee, Howard H., *Professor Emeritus*, Systems Science and Industrial Engineering Department, PhD, 1953, Stanford University: Theoretical biology, evolutionary models of complex systems, linguistic control of dynamic systems. (1975)

Phatak, Dhananjay, *Assistant Professor*, Electrical Engineering Department, PhD, 1994, University of Massachusetts at Amherst: Computer architectures, computer arithmetic, neural networks and applications. (1994)

Piotrowski, Walter, *Associate Professor*, Computer Science Department, PhD, 1990, State University of New York at Binghamton: Operating systems, distributed systems and networks, implementation issues associated with real or prototype systems, real-time systems. (1982)

Pitarresi, James M., *Associate Professor*, Mechanical Engineering Department, PhD, 1986, State University of New York at Buffalo: Computational mechanics, vibration modeling and testing, electronics packaging. (1988)

Plumb, Richard, *Professor and Chair*, Electrical Engineering Department, PhD, 1988, Syracuse University: Electromagnetic modeling, ground-penetrating radar, imaging. (1998)

Sackman, George, *Professor*, Electrical Engineering Department, Registered Professional Engineer, PhD, 1964, Stanford University: Signal processing, digital audio, acoustic space-time array processing. (1984)

Sahay, Chittaranjan, *Associate Professor*, Mechanical Engineering Department: PE, CMfgE; PhD, 1976, Indian Institute of Technology, Delhi: Solid mechanics, manufacturing, and design engineering. (1981)

Sammakia, Bahgat, *Professor*, Mechanical Engineering Department, *Director of Integrated Electronics Engineering Center*, PhD, 1982, State University of New York at Buffalo: Heat transfer, fluid mechanics and electronics packaging. (1998)

Santos, Daryl L., *Assistant Professor*, Systems Science and Industrial Engineering, BS, 1987, Cornell University, MS, 1990 and PhD, 1993, University of Houston: Production scheduling and control, engineering management, engineering economy.

Schwartz, Richard, *Professor Emeritus*, Electrical Engineering Department, PhD, 1959, University of Pennsylvania, Registered Professional Engineer: Microwave theory and techniques, antennas and propagation, acoustics, speech and signal processing. (1985)

Singler, Timothy, *Associate Professor*, Mechanical Engineering Department, PhD, 1982, University of Rochester: Experimental and theoretical fluid mechanics, microhydrodynamics, wetting, interfacial stability, applied mathematics. (1988)

Skormin, Victor, *Professor*, Electrical Engineering Department, PhD, 1975, Moscow Institute of Steel and Alloys: Control engineering, operations research, applied statistics, computer simulation. (1986)

Srihari, Krishnaswami, *Professor*, Systems Science and Industrial Engineering Department, PhD, 1988, Virginia Polytechnic Institute and State University: Manufacturing systems, computer aided process planning, expert systems, computer integrated manufacture. (1988)

Su, Stephen Y. H., *Professor*, Computer Science Department, PhD, 1967, University of Wisconsin at Madison: Fault-tolerant computing, design automation, computer architecture. (1978)

Sun, D.C., *Professor*, Mechanical Engineering Department, Registered Professional Engineer, PhD, 1969, Princeton University: Mechanics, fluid and mechanical systems, and tribology. (1987)

Taylor, Charles, *Associate Professor*, Electrical Engineering Department, MS, 1970, State University of New York at Binghamton: Automation, automatic controls, microprocessor applications, and robotics. (1979)

Wagner, Peter E., *Professor*, Electrical Engineering Department and Physics Department, PhD, 1956, University of California at Berkeley: Semiconductor circuit elements, microwave resonance, surface electricity, applied optics. (1989)

Wexler, Sara, *Lecturer*, Computer Science Department, MSCS, 1988, State University of New York at Binghamton: Computer science education and the development of programming principles and practices, object-oriented programming and design. (1996)

Wu, N. Eva, *Associate Professor*, Electrical Engineering Department, PhD, 1987, University of Minnesota: Approximation, optimization, and stabilization of distributed parameter systems, robust control synthesis theory, control of robotic manipulators, signal processing. (1987)

Ziegler, William, *Associate Professor*, Computer Science Department, MS, 1982, Syracuse University: Program structure and design in procedural, functional and assembler languages, computer science education, university-industry interaction. (1982)

Adjunct Faculty

Agnew, Palmer, MS, 1996, Cornell University
Aigen, Michael L., MS, 1979, State University of New York at Binghamton

Anglin, Christopher R., MSIE, 1996, State University of New York at Binghamton

Boden, Edward B., MSCS, 1982, University of Wisconsin

Bowers, John S., MSCS, 1996, State University of New York at Binghamton

Czarnecki, Stephen, PhD, 1983, Princeton University

Eckert, Doris, MS, 1970, University of Puerto Rico

Elias, Douglas, PhD, 1988, State University of New York at Binghamton
 Frey, Robert, MSEA, 1972, Syracuse University
 Fridrich, Jiri, PhD, 1995, State University of New York at Binghamton
 Glickstein, Ira S., PhD, 1996, State University of New York at Binghamton
 Hinton, Rachel E., MSAT, 1989, State University of New York at Binghamton
 Islam, Mohammed, PhD, 1964, Northeastern University
 Kellerman, Anne, MS, 1964, Georgia Institute of Technology
 Kelly, Barry L., MSSS, 1997, State University of New York at Binghamton
 Lacey, Robert, MS, 1976, State University of New York at Binghamton
 Massara, Joseph, BSME, 1970, Syracuse University
 McNair, Patricia, MSCS, 1993, State University of New York at Binghamton
 Mecklenborg, Richard, MA, 1982, State University of New York at Binghamton
 Pittman, Robert, MS, 1982, Rensselaer Polytechnic Institute
 Poliquin, Molly, MA, 1989, State University of New York at Binghamton
 Reksc, Stanley, MS, 1984, State University of New York at Binghamton
 Rhodes, Donna, PhD, 1988, State University of New York at Binghamton
 Robi, Dennis, MS, 1984, State University of New York at Binghamton
 Sadeghi, Theresa, MS, 1978, Rensselaer Polytechnic Institute
 Schafer, John, PhD, 1967, Syracuse University
 Scudder, David, BS, 1984, State University of New York-Empire State College
 Shafer, Stephen, MSCS, 1984, State University of New York at Binghamton
 Simic, Berto, MSCS, 1980, State University of New York at Binghamton
 Snethen, Thomas, MSEE, 1965, Massachusetts Institute of Technology
 St. Clair, Ute, PhD, 1980, Ohio State University
 Standish, Charles, PhD, 1954, Cornell University
 Steflik, Richard, MS, 1977, State University of New York at Binghamton
 Umrigar, Zerkis, D., PhD, 1986, Syracuse University
 Woychik, Charles, PhD, 1984, Carnegie Mellon University

WATSON SCHOOL OF ENGINEERING AND APPLIED SCIENCE

MISSION STATEMENT

The mission of the Watson School is to provide instructional and research services in the broad field of engineering and applied science. To fulfill this mission, the school:

- Offers baccalaureate, master's, and doctoral programs that prepare graduates for employment in the technical professions and combine a firm grounding in fundamentals, elements of practical application and an appreciation for liberal learning.
- Conducts basic and applied research that expands the technical knowledge base and advances industrial practice.
- Provides support for the economic development of the state of New York.
- Offers contract and noncredit continuing education opportunities for practicing professionals.
- Provides its programs and services at a price that assures their accessibility to the widest possible range of the citizens and companies of New York state.

THE PROGRAMS

The Thomas J. Watson School of Engineering and Applied Science comprises the Departments of Computer Science, Electrical Engineering, Mechanical Engineering, and Systems Science and Industrial Engineering. The school is housed in a 121,400-square-foot building designed and equipped specifically for studies in engineering and computer science. Established in 1983, the school combined existing programs in computer science and systems science with new programs in electrical engineering, mechanical engineering and industrial engineering.

The Watson School offers bachelor of science degrees in computer science, electrical engineering, computer engineering, mechanical engineering, and industrial and systems engineering. The computer science degree is accredited by the Computer Science Accreditation Board (CSAB) and the engineering degrees are accredited by the Accreditation Board for Engineering and Technology (ABET).

The following advanced degrees are also offered by the Watson School: master of science in computer science, electrical engineering, industrial engineering, mechanical engineering, systems science, and a master of engineering (MEng), a practice-oriented graduate degree. In addition, there are doctoral programs in electrical engineering, computer science, mechanical engineering, and systems science (with an

optional specialization in manufacturing systems).

To serve the technical community, the Watson School provides extensive continuing education programs, including short courses, symposia and special contract instructional programs.

The Watson School's undergraduate degrees combine a strong theoretical base with extensive practical application through laboratory and design projects as well as internships. Entering engineering freshmen participate in the Design, Technology and Communications (DTeC) four-course sequence that integrates instruction in computer applications, graphics and audio, technical writing and speaking, and engineering design. Computer science majors are offered similar integrated educational experiences. Students are encouraged to obtain technical experience in industry during the summer. The engineering programs also accept students as junior transfers from community college engineering science programs, other four-year engineering programs and other four-year colleges. The graduate program provides strong research opportunities in a number of areas including electronics packaging, computing technologies and intelligent systems.

The school serves full-time and part-time degree students as well as nondegree students in common course experiences. Many graduate courses are offered in the late afternoon and early evening to accommodate students employed in local industry.

UNDERGRADUATE INFORMATION

Admission

The application procedure for the Watson School's undergraduate programs is essentially the same as for admission to Binghamton University. Please refer to the general information section on Admissions in this *Bulletin*.

Computer science majors are admitted at the freshman level or as transfer students directly into the computer science degree program. Students may enter the undergraduate engineering programs as freshmen by admission to the Division of Engineering Design, or as junior transfers directly into electrical, mechanical or industrial and systems engineering degree programs.

Junior engineering transfers should have completed the equivalent of the associate of science in engineering science degree offered by New York state community colleges, which includes the following subjects:

- Calculus I, II, III and differential equations
- Three courses in calculus-based physics
- One course in chemistry

- One course in materials science or modern physics, or a second course in chemistry
- One course in English composition or technical writing
- Engineering mechanics (statics and dynamics)
- A first course in electric circuits
- Eight semester-credits in humanities and/or social sciences
- Proficiency in engineering graphics and in a computer language (C, FORTRAN or Pascal)

A total of 60 credits will be accepted for transfer from an engineering science curriculum or its equivalent. A minimum grade-point average of 2.6 is required.

The Harpur 3/2 program, BA (physics) and BS (engineering), is described under the Department of Physics in the Harpur College section. Other double degrees are also possible, and may be discussed on an individual basis in the Watson advising office.

A double degree program may also be arranged between computer science and other disciplines.

Financial Aid

Watson School students are eligible to participate in the University's financial aid program. Normally, such aid is available only to matriculated students. Those interested in obtaining financial aid should contact the director of student financial aid and employment as soon as possible to determine their eligibility.

Watson School Scholarships

Outstanding applicants to the undergraduate programs in engineering and computer science are eligible for Watson School scholarships. Appointments will be based on prior academic record. For more information on scholarships, contact the Watson School advising office.

Nondegree Status

Individuals interested in taking courses for credit, but not in pursuing a degree program, may apply for admission as nondegree students. All nondegree students are subject to the administrative guidelines described elsewhere in this *Bulletin*. On acceptance, they may enroll as space permits in Watson School courses for which they have completed the prerequisites. Courses taken under nondegree status may be accepted later to satisfy requirements in specific Watson School degree programs.

Continuing Education

In addition to the credit courses, various noncredit courses are offered each semester by the continuing education program of the Watson

School. The goals of this program are to keep technical personnel informed of advances in their fields and to stimulate innovation. These courses are conceived and developed in close cooperation with the technical community. This enables us to focus on immediate training needs and to design programs specific to those needs. For more information, contact the director of continuing education of the Watson School.

Academic Policies

The Watson School generally follows the academic policies announced in this *Bulletin*, the *Student Course Guide*, the *Schedule of Classes*, the *Undergraduate Academic Handbook* and *Rules for Student Conduct*. The following policies also apply to Watson School students, who are expected to be familiar with and abide by the regulations in this section and the University-wide policies in the publications listed above.

All matriculated students follow the requirements for graduation listed in the *Bulletin* current at the time they are admitted. However, undergraduate students who interrupt enrollments for three or more consecutive semesters are governed by the *Bulletin* in effect when they are readmitted.

Upon the adviser's recommendation and approval of petition through the appropriate department chair, students may elect a later *Bulletin* under which to fulfill their degree requirements. A combination of requirements from different *Bulletins*, however, is not permissible.

Program Load and Planning

Students are considered full time if they are registered for 12 credit hours or more. The maximum number of credits a Watson School student may take, without an approved petition, is 18. General academic petitions to overload are only approved for graduating seniors in good standing, or for those with a 3.0 grade-point average and no grades of Incomplete.

Watson School students may drop below 12 credits without permission and be classified as part time. Students receiving financial aid should check with the Student Financial Aid and Employment office before dropping to part time, because their action may affect aid eligibility.

Requirements for Degrees

To receive any Watson School undergraduate degree, students must satisfactorily complete at least 30 credits of Binghamton courses taken entirely in the Watson School. Requests for exceptions to this policy must be made by

petition to the Watson School academic affairs committee and be approved by the dean.

For additional graduation requirements, consult the descriptions of the specific degrees.

GENERAL EDUCATION REQUIREMENTS

All newly admitted Watson School students are subject to the University's General Education requirements. (These requirements are waived for all transfers who have earned a minimum of 57 credits prior to entering their Binghamton major.) For a complete description of General Education, refer to that section of the *Bulletin*.

For all Watson School majors, the science, mathematics and composition General Education requirements are automatically met within each major. For Division of Engineering Design students, global vision courses will be selected from the special humanities/social science list provided by the Watson School advising office. Computer science freshmen can spread the two global vision courses, plus the aesthetics course, throughout their freshman and sophomore years. For further information, refer to "General Education and Your Watson School Major," available in the Watson School advising office (EB, Area H).

Grading System

Students who enroll in courses offered outside of the Watson School undergraduate programs will be graded according to the grading system of the school offering the course. Such students may petition to have the Watson School's undergraduate grading system apply.

Watson School undergraduate courses are graded in one of two ways: 1) A, A-, B+, B, B-, C+, C, C-, D, F, W, WP, WF, or 2) P/F. Students normally choose the first option. However, in certain cases, students may elect the Pass/Fail option and receive a P (Pass) or F (Fail) rather than a traditional grade. This option may be elected for a maximum of four free-elective credits for computer science, exclusive of any required course that is offered only on a Pass/Fail basis.

INCOMPLETES

Instructors may temporarily submit a grade notation of Incomplete, which appears in grade reports as I. A grade of Incomplete must be removed and replaced with a permanent grade no later than the last day of classes of the semester following the one in which it was received; however, an instructor may set an earlier date for completion of the work. If the grade is not removed by the applicable date, and an extension has not been granted, the grade of I automatically becomes a grade of F.

WITHDRAWAL FROM A COURSE

If a student withdraws from a course after the official deadline to drop a course, the instructor may assign a grade of WP (withdrawn passing) or WF (withdrawn failing). A grade of W is assigned only when a student has withdrawn from all courses and thus from the University. The grades of WP and W do not count as courses taken. A WF is equivalent to an F. No changes will be made to an undergraduate record after two years have passed.

Add/Drop Policies

Students are expected to be familiar with the University-wide policies governing changes in their course registration, specifically the add/drop deadlines. No changes will be made to an undergraduate record after two years have passed.

Add Deadline: End of the second week of the semester.

1. Deadline to add a course to the schedule.
2. Deadline to change "audit" to "credit."

Drop Deadline: Five class days after midsemester.

1. Deadline to drop a course without academic penalty.
2. Deadline to change "credit" to "audit."
3. Deadline to change a grading option (e.g., from normal to P/F).

Note: If an academic petition is approved for a late add or late drop because of extraordinary circumstances, the Student Accounts office will impose a late add/drop fee.

Academic Standing

SATISFACTORY ACADEMIC PROGRESS

Students' academic progress is reviewed at the end of each regular semester to ensure that satisfactory progress is maintained. "Satisfactory progress" is defined as maintaining a 2.0 grade-point average (GPA). The GPA is calculated on a 4.0 system using the following grade-point equivalents:

A = 4.0	C+ = 2.3
A- = 3.7	C = 2.0
B+ = 3.3	C- = 1.7
B = 3.0	D = 1.0
B- = 2.7	F = 0.0

For undergraduates, a D grade is considered passing. However, some students are advised to retake a course. If a course is retaken, that grade also becomes a part of the cumulative grade point average. However, when a course in which

a student has earned a grade of D or better is retaken, it does not count toward full-time enrollment during the semester in which it is retaken.

ACADEMIC HONORS

Students who complete any given semester with a 3.5 or better grade-point average are placed on the Dean's Honors List. For both part- and full-time students, this honor is noted on the permanent transcript.

For graduation honors, the criteria are:

- 3.5 - 3.69 = cum laude
- 3.7 - 3.84 = magna cum laude
- 3.85 - 4.00 = summa cum laude

ACADEMIC PROBATION AND SUSPENSION

Provisional Probation. Students whose GPA for a given semester falls below 2.0 will be placed on provisional probation for the following semester, as long as their cumulative grade-point average is above 2.0. Provisional probation is not listed on student transcripts.

Probation. Students whose cumulative grade-point average for courses taken at Binghamton falls below 2.0 will be placed on academic probation for the following semester, and will be subject to the following restrictions:

1. They may not register for more than 14 credit hours.
2. They may not run for or accept any campus office or committee chairmanship.

Students are removed from probation when the cumulative GPA is brought up to 2.0.

Academic probation does not preclude students from receiving financial aid. Standards for financial eligibility are described in the Financial Information section of this *Bulletin*.

Suspension. Students on probation who again fail to meet both the 2.0 cumulative GPA and the last-semester GPA given in the table below will be suspended. The credit hours attempted are those taken as a matriculated student. Students who meet the last-semester GPA requirement but still post a cumulative GPA under 2.0 will remain on probation.

Hours Attempted	Last Semester GPA
0-16	2.0
17-32	2.1
33-48	2.1
49-64	2.2
65+	2.3

Full-time students who fail to achieve a 1.5 GPA during the first semester in residence will be placed on suspension.

Suspension becomes effective immediately when it is imposed. The duration for academic suspension is one semester, and students will not

be considered for readmission during that period. All applications for readmission, after a minimum period away from school, must be filed through the Undergraduate Admissions office.

Dismissal. Students who, after being suspended and readmitted twice, again fail to meet the required academic standards will be dismissed. The Academic Affairs Committee will hear a single appeal of dismissal after demonstration of significant changes.

Appeals of decisions of the Academic Affairs Committee will be referred to the dean.

For the purpose of determining academic standing, credits earned prior to matriculation in the Watson School may be reviewed.

Grievance Procedure

Resolution of student-faculty grievances should be initiated on an informal basis between the parties directly concerned or with the department chair. If such attempts cannot bring about a conciliation, then the complaint may be submitted to the Watson School grievance committee. Copies of the grievance procedure are available in the dean's office.

Withdrawal and Readmission

Students who withdraw from the Watson School and wish to remain in good standing must follow a formal withdrawal procedure. *Mere absence from class does not constitute withdrawal.* Withdrawal forms may be obtained from the Watson School advising office or the Registrar's office, either in person or through the mail. A grade of W is assigned when the student has withdrawn from all courses and thus from the University. Grades of W do not count as courses taken.

The Watson School applies the same withdrawal and readmission policies as established for the University, except that Watson School students may drop below a 12-credit program without permission.

Undergraduate students must apply for readmission through the Undergraduate Admissions office if they have not been in attendance for one or more semesters.

Students who interrupt enrollment for three or more consecutive semesters are governed by the *Bulletin* in effect when they are readmitted. Summer sessions and the semester when a student officially withdraws are not included in this count. Exceptions are made for students eligible to continue at Binghamton who are forced to leave because of involuntary call to military service.

Activities and Student Services

All Watson School students are eligible to receive the services provided for all students at Binghamton, and to participate in the various student activities. Students should familiarize themselves with the *Bulletin* sections on services for students and student activities.

Student Organizations and Professional Societies

Institute of Electrical and Electronics Engineers (IEEE)

Association of Computing Machinery (ACM)
American Society of Mechanical Engineers (ASME)

National Society of Black Engineers (NSBE)
Pi Tau Sigma (mechanical engineering honor society)

Society of Automotive Engineers (SAE)
Society of Manufacturing Engineers (SME)
Society of Women Engineers (SWE)

Upsilon Pi Epsilon (honor society for the computing sciences)

Tau Beta Pi (engineering honor society)

Eta Kappa Nu (electrical engineering honor society)

GRADUATE INFORMATION

Submit inquiries to:

Associate Dean for Academic Affairs and Administration

Thomas J. Watson School of Engineering and Applied Science

Binghamton University

PO Box 6000

Binghamton, New York 13902-6000

Admission to the Graduate Programs

Prospective students should request application materials from the Graduate School. Official transcripts, the completed application form, a statement of professional goals, Graduate Record Examination (GRE) scores and two letters of recommendation are required. International applicants whose native language is not English must also submit the results of the Test of English as a Foreign Language (TOEFL) and a statement of financial means. Assistantships are awarded on the basis of merit and required skills.

Prospective students may also be admitted to coursework by submitting an application to the Graduate School for nondegree, nonmatriculated status. Nondegree students are allowed to take

courses without lengthy documentation but are encouraged to apply for matriculated status after one semester of study. This process is especially advantageous for students who must first complete undergraduate prerequisite courses before beginning graduate-level coursework. This process should be discussed with one of the program advisers.

Master's Programs

The Watson School offers master of science degrees in computer science, electrical engineering, industrial engineering, mechanical engineering and systems science. A Master of Engineering (MEng) degree with various specializations is also available. The MEng is a practice-oriented degree that culminates in a sequence of two courses that focus on engineering projects. These programs are described fully under the appropriate headings below.

Doctoral Programs

The Watson School offers the PhD in computer science, electrical engineering, mechanical engineering, systems science, and systems science with a specialization in manufacturing systems.

The PhD programs prepare students for basic and applied research in the areas of engineering, computer science and systems science covered by Watson School curricula. Research areas are multidisciplinary and reflect the interests of the Watson School faculty. Current research areas include composites properties, reactive fluid models of metallurgical processes, mechanical vibrations, convective heat transfer, Moire strain analysis, general systems methodologies, systems design and systems modeling, fuzzy logic and fuzzy systems, remote sensing, computer graphics, adaptive systems, expert systems, information theory, symbolic computation, cognitive models, computer architecture, computer networks, database systems, distributed systems, information retrieval, fault testing and diagnosis, operating systems, parallel processing, real-time systems, software specification and verification, VLSI systems, thin films, optimization and controls, neural networks, parallel architectures, machine vision, computational electromagnetics, electronics packaging, switched-mode power supplies and device modeling. Prospective students should contact the Watson School for an updated list of current research topics.

Minimum Requirements

- a. Satisfaction of learning contract, including proficiency in teaching and residence requirements.

- b. Satisfaction of comprehensive qualifying requirement.
- c. Presentation of colloquium on proposed research.
- d. Acceptance of prospectus outlining dissertation research.
- e. Submission of dissertation.
- f. Defense of dissertation at oral examination.

Applicants: Additional Materials

For admission to a doctoral program, current students in a Watson School master's program are required to present to the director of graduate studies letters of recommendation from two Watson School faculty, and a statement of the area of research in which they plan to do their dissertation. Students from other institutions should write to the director of graduate studies in their prospective program, Watson School, Binghamton University, PO Box 6000, Binghamton, New York 13902-6000, and give a summary of their academic background and a statement of their field of research interest. Owing to the wide range of potential research topics and the limited enrollment in the PhD program, preliminary discussions with the applicant are expected before the student's acceptance. Applicants must submit GRE scores in the verbal, quantitative and analytical tests.

All application materials should be received before February 15 for decisions on fall admission, and before November 1 for decisions on spring admission.

Guidance Committee

On acceptance into a program, students must form an approved guidance committee. The guidance committee consists of from three to five members, normally full-time Watson School faculty; however, students may propose members from other schools at Binghamton University, faculty from other universities or professionals from outside academe. The guidance committee advises the student and evaluates and certifies the student's performance throughout the program of study and research.

Learning Contract

In consultation with the guidance committee, the student prepares a learning contract in which a program of study is specified, including the major area of research, additional course requirements, teaching requirement, evaluation procedures and the form of the comprehensive examination. Although the learning contract may be modified as the research interests of the student develop, to assure competence and depth in the major area

and breadth in relevant disciplines, each modification must be approved by the guidance committee and properly documented. A copy of the learning contract is placed on file in the dean's office.

Comprehensive Qualifying Requirement

On admission to a PhD program, the student must prepare to demonstrate mastery of fundamental skills to the guidance committee. This comprehensive qualifying requirement is normally satisfied by:

- a. completing courses in academic areas specified in the learning contract; and
- b. completing a written and oral examination that covers material specified in the learning contract and administered by the student's guidance committee.

In exceptional cases, with approval of the graduate studies committee, a student may satisfy some of the requirements by means of previous academic experience, publications, or other evidence of competence.

Candidacy

When the comprehensive requirement is accepted by the guidance committee, the student is recommended for admission to candidacy. The student has six months from completion of the comprehensive requirement to submit an approved prospectus to the dean's office.

Colloquium and Prospectus

The student presents, for evaluation by the Watson School faculty, a colloquium on the proposed research, demonstrating an ability to use suitable research methodologies and to identify relevant problems in the area of concentration.

Using the results of the colloquium, the student, in consultation with the guidance committee, prepares a more detailed prospectus outlining the dissertation research, which is filed in the Watson School dean's office.

Proficiency in Teaching

In addition to the coursework and research, doctoral candidates must demonstrate proficiency in teaching. Doctoral students must meet a teaching requirement in one of the following ways:

- a. (first preference) as an instructor of record in an undergraduate course.
- b. the completion of WTSN 591 (Teaching Methods in Technical Courses) and the teaching of one or more seminars or a portion of a course.

- c. history of teaching experience comparable to choices a. or b. (above), verified and approved by the guidance committee.

Residence Requirement

Refer to the Academic Policies and Procedures section of this *Bulletin*.

Language Requirement

There is no formal language requirement; however, individual students may have a language requirement specified in the learning contract.

Dissertation

With the guidance of the dissertation adviser, the student completes research and preparation of the dissertation, an original written contribution demonstrating originality and competence in the chosen field of research. The guidance committee has direct charge of all matters pertaining to the dissertation, which must have the committee's unanimous approval before arrangements are made for the final examination for the degree. The dissertation is to comply with the format and filing requirements set forth in the *Graduate School Student Handbook*.

In defense of the dissertation, the student is required to pass an oral examination, open to the University community. The evaluation of the student's performance in this oral examination is made by an examination committee consisting of members of the student's guidance committee, augmented by an outside examiner appointed by the vice provost for graduate studies and teaching. The decision to recommend the candidate for the doctoral degree is made by unanimous vote of the guidance committee.

Courses

The course descriptions listed under the department sections that follow, while indicating the nature and scope of the Watson School programs, are not a historical record, nor do they include the school's experimental or continuing education offerings.

All courses in the Watson School with numbers below 300 are classified as lower-division (freshman/sophomore) and do not require prerequisites for enrollment, unless otherwise specified in the course description. Courses numbered 300 and above are advanced courses normally open only to students who have at least junior standing and who meet any additional prerequisites stated in the course description. Students may be granted a waiver of course prerequisites upon the recommendation of a program adviser or with the permission of the appropriate department chair.

Courses numbered 500 or higher are graduate courses. Undergraduate students may file a general academic petition to take graduate-level courses for which they are qualified. The petition must be signed by the course instructor, the student's department chair and the associate dean for academic affairs. Credits from such courses may be used to meet baccalaureate degree requirements. Students who are within eight credits of their baccalaureate degree may petition to receive graduate credit for up to two courses. The petition must be approved by the Registrar, Financial Aid and Student Accounts offices by the add deadline of the semester in which the courses are taken.

SCHOOL-WIDE COURSES

WTSN 573. ELEMENTS OF ENGINEERING PRACTICE *3 credits*

The first in a set of two courses that serves as the capstone for the master of engineering (MEng) degree, this course prepares early-career engineers to conduct the various kinds of projects they may be asked to do as practicing engineers.

WTSN 574. ENGINEERING PROJECT *3 credits*

The second in a set of two courses that serves as the capstone for the master of engineering (MEng) degree, this is the execution of the project defined in WTSN 573. Prerequisite: WTSN 573.

WTSN 581. ELECTRONICS PACKAGING SYSTEMS *1 credit*

Exposes the student to the latest developments in the field of electronics packaging by using a variety of academic and industrial experts. Provides a broad perspective on the electronics packaging concepts, terminology, industry and recent developments. Addresses design, materials and manufacturing aspects of electronics packages. Prerequisite: graduate standing.

WTSN 591. TEACHING METHODS IN TECHNICAL COURSES *1 credit*

Introduction to principles of effective teaching, including course design, use of objectives, lecturing, discussion methods, examination design, theories of learning and personal style. Students present seminar for critique. Complements research seminar. Contributes toward meeting doctoral teaching proficiency requirement. Prerequisite: graduate standing.