ELECTRICAL AND COMPUTER ENGINEERING
UNDERGRADUATE HANDBOOK

This handbook has been created to assist students and faculty members in the Electrical Engineering and Computer Engineering programs at Binghamton University. The handbook is intended to compliment the University Bulletin, and to specifically provide further details about University policies and procedures, as well as the Electrical Engineering and Computer Engineering undergraduate programs, and will be revised periodically to include up to date program information and policy changes. Comments and suggestions of how this handbook can be improved are always welcome. Please contact:

Dr. Stephen Zahorian
ECE Department Chair
Engineering and Science Building, ES-2312
Phone: (607) 777-4846
zahorian@binghamton.edu

Ms. Kim Murphy
ECE Assistant to Chair
Engineering and Science Building, ES-2311
Phone: (607) 777-4840
kmurphy@binghamton.edu

Ms. Shelie VanKuren
ECE Undergraduate and Graduate Secretary
Engineering and Science Building, ES-2313
Phone: (607) 777-5323
svankure@binghamton.edu

Dr. Scott Craver
ECE Undergraduate Director
Engineering and Science Building, ES-2310
Phone: (607) 777-7238
scraver@binghamton.edu

It is the responsibility of the individual student to be familiar with information contained in the University Bulletin. With respect to official University policy and regulations, the University Bulletin takes precedence over any information contained in this handbook.
# TABLE OF CONTENTS

I. **Introduction**
   - Program Objectives and Student Outcomes 4

II. **Department of Electrical and Computer Engineering**
   - Overview 5

III. **Undergraduate Admissions**
   - Freshman Admissions 6
   - Home-Schooled Applicants 6
   - How Freshman Decisions are Made 7
   - Early Admission 8
   - Deferred Admission 8
   - General Education Requirements Statement 8
   - Articulation Agreements 8
   - Transfers to Electrical & Computer Engineering 9
   - Spring Transfers 10
   - Transfers with Applied Science 10
   - Financial Aid 10

IV. **Academic Policies**
   - Academic Integrity 11
   - Program Load and Planning 12
   - Requirements for Degrees Statement 12
   - Student Advising 12
   - Student Monitoring via Degree Works 13
   - Catalog Year 14
   - Advanced Placement Credit 15
   - Equivalency Chart 15
   - Watson General Education Requirements 18
   - Learning Outcomes for General Education 19
   - Grading System 22
   - Add / Drop Policies 22
   - Incompletes 22
   - Course Withdrawal after Deadline – Watson Policy 23
   - Academic Standing 23
   - Satisfactory Academic Progress 23
   - Repeating Courses 23
   - Academic Honors 23
   - Academic Probation / Suspension 24
   - Complete Withdrawal and Re-enrollment 25
   - Final Examinations 25
   - Change of Grade 25
   - Undergraduate Degree & Commencement Participation 26
V. Academic Programs

Core Curricula – EE and CoE first year
EE – final three years
EE Curricula Diagram
CoE – final three years
CoE Curricula Diagram
Electives
Course Substitutions
Taking Graduate Courses as an Undergraduate
Courses at Other Institutions
Independent Study, Industrial Internship,
Undergraduate Research & Teaching Practicum
Dual Majors and Minors
Study Abroad
Accelerated Master’s Degree Programs
BS / MSEE
BS / MBA

VI. ECE Undergraduate Course Descriptions

Required EE and CoE
EE Required / CoE Electives
CoE Required / EE Electives
EE and CoE Electives

VII. Watson School Student Organizations

VIII. Contact Information

Watson Dean’s Office
Watson Advising and other General Offices
ECE Department Faculty and Staff

IX. Frequently Asked Questions

Grades
General Education
Transfer Credits
 Majors / Minors
Courses
Volunteers / Internships / Study Abroad
Probation
Graduating

X. List of Pertinent Links
I. INTRODUCTION

This handbook contains information on the Bachelor of Science degree programs in Electrical Engineering and Computer Engineering at Binghamton University. Both programs are accredited by the Engineering Accreditation Commission ABET, http://www.abet.org.

Program Educational Objectives

Graduates of the EE and CoE programs should be on a path to proficiency in the following four areas:

1. **Leadership:** Graduates will be known for leadership, innovation, entrepreneurship, or responsibility as appropriate for their career stage.
2. **Education:** Graduates will continue their education through a combination of independent learning, continuing education and advanced degrees.
3. **Adaptability:** Graduate will demonstrate flexibility in a career that utilizes skills and knowledge gained in their undergraduate engineering program.
4. **Participation:** Graduates will be known as active participants in a wide variety of both professional and non-professional activities, including jobs, professional societies, community activities, or government service.

Student Outcomes

The following abilities and knowledge are expected to be demonstrated by students upon time of graduation:

1. The ability to apply knowledge of mathematics, science, and engineering.
2. The ability to design and conduct experiments, as well as to analyze and interpret data.
3. The ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
4. The ability to function as an electrical or computer engineer on multi-disciplinary teams.
5. The ability to identify, formulate, and solve electrical or computer engineering problems.
6. The ability to understand the professional and ethical responsibilities of an engineer.
7. The ability to communicate effectively.
8. Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. Recognition of the need for, and an ability to engage in life-long learning.
10. Knowledge of contemporary issues.
11. The ability to use the techniques, skills, and modern engineering tools necessary for electrical or computer engineering practice.
II. DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING OVERVIEW

Through high-quality educational and research programs, the department serves and enriches society, advances knowledge, and prepares graduates to excel, innovate and lead.

**Electrical Engineering (EE)** is one of the broadest and largest engineering disciplines. Many electrical engineers work in the areas of design, analysis and application of electrical/electronic components, circuits, and systems. Many electrical engineers work in areas focused on the analysis, design, and application of information processing systems such as communication systems, medical imaging and military sensors. The areas in which electrical engineers work span the spectrum from the atomic level to systems level design. Within this spectrum, an electrical engineer may focus on the atomic level operation of micro-electronic devices or on the design of integrated circuits, electronic circuits, or systems that process and transmit signals, information, and electrical power.

**Computer Engineering (CoE)** encompassed primarily the design of computers and other digital systems, emerging as a bridge between electrical engineering and computer science. Driven by technological advancements that have made computing technology inexpensive and small enough to incorporate into a wide-range of products and systems, computer engineering has become one of the core engineering disciplines. The scope of products and systems containing computer technology is ever-expanding, ranging from small embedded computers in consumer electronics, appliances and automobiles to complex computer-based systems controlling power generation, manufacturing, and telecommunications systems. The role of the computer engineer includes the design, analysis and implementation of computing technology as well as its integration into devices and systems that use computers as components or tools. As a result, computer engineers work in many industries, including aerospace, automobile, computer, defense, electronics, information technology, networking, and telecommunications.

The first year is common among all the engineering programs in the Watson School of Engineering and Applied Science and provides fundamentals in mathematics and science, principles that underlie all engineering disciplines, technical communication in both spoken and written forms, and courses required by the University’s General Education Requirements.

In the second year, students may enter the Electrical Engineering Program or Computer Engineering Program, but the courses remain common between electrical and computer engineering students. This year provides the basic set of skills and knowledge that is common between the two programs, including continuing work in science and mathematics. In addition, the Electrical and Computer Engineering
Seminar I course provides students with an overview of both CoE-specific as well as EE-specific technical areas and insights into the different levels at which electrical and computer engineers can work (e.g., device-level, circuit-level, system-level, etc.)

In the third year, EE and CoE students take most of the courses that provide a background with enough breadth to support a large variety of career paths as well as allow effective interaction with specialists in a variety of areas. These courses draw from traditional electrical and computer engineering courses. Having been exposed to a wide range of courses by the end of the third year, the students have enough familiarity with the field to select electives during their fourth year. A key feature of the third year is a second seminar course that focuses on professional issues such as typical career paths in ECE areas, engineering ethics, resume writing, job search techniques, preparing for graduate school, professional engineer license, etc. Another key feature of the junior year is the Design Lab, which ties together all areas of the engineering curriculum and provides students with experience in solving open-ended design problems with realistic specifications. In addition, students are introduced to coping with real-world design issues and constraints.

Our Electrical Engineering and Computer Engineering programs provide breadth across the disciplines and a balance between theory and application. In addition, a large number of laboratory courses provide opportunities for hands-on learning. Both programs provide graduates with the skills and knowledge necessary for a dynamic career in either Electrical or Computer Engineering, or a variety of other careers.

III. UNDERGRADUATE ADMISSIONS

Freshman Admissions

Freshmen are defined as students who have attempted no college coursework, or whose only college courses were pursued before high school graduation. All of Binghamton’s undergraduate schools accept freshman applicants. Visit: [http://www.binghamton.edu/admissions/](http://www.binghamton.edu/admissions/) where you can find the Common Application or the SUNY Application as well as other required application materials, such as, transcripts, SAT/ACT scores, and teacher or counselor recommendations. After your application is submitted, use the application status checker to see if there are additional items you need to provide to complete your application.

If admitted, there is a $350 university deposit that must be paid by May 1 and is non-refundable.

Home-Schooled Applicants

Binghamton is happy to accept and review applications from students who received their education through home-schooling experiences.
To maintain consistency in how we read applications from all students and to ensure we can thoroughly evaluate whether you've met the necessary foundation of skills and academic credentials to be successful at Binghamton, as a home-schooled applicant, you must submit the following materials in addition to those required of all freshman applicants:

An individualized home instruction plan (IHIP) for all four years or a complete portfolio of your work. Quarterly reports covering your entire "high school" time are also accepted.

**AND EITHER**

A letter from the superintendent of the school district in which you reside attesting to your completion of a program of home instruction that is the substantial equivalent of a four-year high school course of instruction.

**OR**

A high school equivalency diploma (GED). Please provide the score report (a passing score is required) and the diploma itself, if available.

Submit these materials:

**By mail:** Binghamton University
Office of Undergraduate Admissions
PO Box 6001
Binghamton, NY 13902-6001

**Fax:** 607–777–4445

**Scan/e-mail:** ksweeney@binghamton.edu

Karen Sweeney Cummings is the admissions counselor for home-schooled applicants. Contact her at 607–777–2171 or ksweeney@binghamton.edu if you have any questions about applying to Binghamton.

All enrolling students must complete, with the aid of a health official, a health history and a physical examination report prior to registration. Students unable to submit health forms because of religious affiliation should consult the University Health Service for alternatives.

**How Freshman Admissions Decisions are Made**

Applicants to the University are admitted on the total merit of their applications. While academic criteria such as grades, quality and level of courses, test scores, trend of grades, and rank are primary, involvement in leadership and school and community activities, recommendations, and how effectively an applicant communicates strengths and interest, are also important (and sometimes crucial) elements in an admission decision. There is no automatic cutoff in the admission process, either in GPA, test scores, or rank, as the Admissions Committee is aware of differences in how secondary schools grade and rank their students, as well as ways in which secondary-school offerings and competitiveness vary.
The Admissions Committee seeks to enroll the strongest and most diverse class possible. Candidates who complete the SUNY Application are urged to make full use of the Supplementary Admission Form. The Admissions Committee is sensitive to all types of achievement and welcomes information about the candidate’s values, aspirations, and personal challenges. Students who meet both academic and financial criteria may be admitted to the Educational Opportunity Program, and students living in Broome and Tioga counties are afforded a degree of flexibility in the admission process.

### Early Admission

Applicants who have completed their junior year of high school but have not graduated may be considered for admission. Approval of such early admission is contingent on the student’s meeting the normal entrance requirements and admission criteria. Early applicants should submit the regular application form. Note that persons who have not graduated from high school may be ineligible for some forms of financial aid.

### Deferred Admission

Students who wish to defer their enrollment for one or two semesters, after having been admitted and having paid their tuition deposit, should contact the Admissions Office. Deferments are not automatically given but, depending on the admission competition and general demand for them, may be granted for some of the undergraduate schools.

### General Education Requirements Statement

Binghamton University has had a General Education program for all undergraduate students since 1996, which meets State University of New York (SUNY) requirements. As a condition of graduation, baccalaureate students entering BU are required to complete a General Education program which consists of: Composition, Oral Communications, Foreign Language, Global Interdependencies, Pluralism in the United States, Aesthetics, Humanities, Laboratory Science, Social Sciences, Mathematics/Reasoning, Wellness, and Physical Activity.

Detailed information regarding these requirements can be found in Section IV of this handbook.

### Articulation Agreements

Articulation Agreements between Binghamton University and many community colleges facilitate the transfer of students from those colleges into the various programs and schools of the University. Agreements exist between all members of the Two-Year Engineering Science Association (TYESA).
Transfer Students to Electrical & Computer Engineering

Students transferring into the Engineering Design Division (freshman year of engineering) have their credits transferred on a course-by-course basis. Any courses in which they receive a grade of C– or better and which apply to their major requirements will transfer.

Transfers into electrical or computer engineering who expect to enter at the junior level should have completed the following courses, if they intend to complete the BS in EE or CoE in two years of full-time study, beginning in a fall semester. Credits are transferred on a course-by-course basis, as per the list below:

(a) Calculus I and II, Differential Equations
(b) 2 (two) semesters of Calculus-based physics
(c) 1 (one) course in college Chemistry and one additional course in Science/Math
(d) 2 (two) courses in English Composition or Technical Writing
(e) 2 (two) courses in Humanities / Social Science (best if US History / World History or Western Civilization)
(f) First course in Electrical Circuits
(g) Introductory Programming Course in C or C++
(h) Probability and Statistics (Note: If not available, then Calculus III (for EE) or Discrete Mathematics (for CoE) can be taken and ISE 261 can be completed after transfer.)
(i) Data Structures and algorithms
(j) Microprocessors
(k) Digital Logic

For transfer students from SUNY two year colleges, please refer to URL below, which is the seamless transfer agreement that encompasses all SUNY two year and four year schools. Click on the link for Engineering: Computer or Engineering: Electrical. To transfer “seamlessly” you should take all the courses listed for the computer/electrical major. Institution specific courses for Binghamton include courses equivalent to ISE 261, Probability and Statistics and EECE 287, Sophomore Design. You may either take equivalent courses at your two year school or take these courses after you transfer to Binghamton.

http://www.suny.edu/attend/get-started/transfer-students/suny-transfer-paths/suny-transfer-paths-all-2015/

ECE does not accept any transfer courses for EECE 3xx (junior level) courses.
Students also transfer from a variety of other backgrounds, entering at various levels depending upon an evaluation of their transfer credits. Any questionable course is evaluated in consultation with a faculty adviser. Any student who is not ready for the sophomore year is usually placed in the Engineering Design Division.
Those who plan to enter ECE from Binghamton University’s Harpur College (or another area) via intra-University transfer (IUT) are advised to meet with the Director of Watson Advising to insure adequate sophomore year preparation prior to filing the IUT, available on the Office of Undergraduate Admissions’ website. All decisions are made by Watson Advising, in consultation with engineering faculty. The Office of Undergraduate Admissions is notified of all decisions, informs applicants and oversees the change of schools and curriculum code in consultation with the Office of Student Records. Watson Advising then sends pertinent file information directly to the appropriate department to begin their file and assign a faculty adviser.

**Spring Transfers**

In many cases, students who transfer to Binghamton University in the spring will require at least five semesters to graduate, due to the fact that most junior and senior ECE courses are only offered once per year.

**Transfers with Associate of Science in Applied Science Degree**

Students occasionally apply for transfer with the Associate of Science in Applied Science, which is a Technology degree and does not have math and calculus-based science requirements of the AS/ES. These transfer credits are individually reviewed by Watson Advising and they begin in the department of Engineering Design Division with the understanding that they will need at least three (3) years to complete the BS EE or CoE degree, depending on their background. Some of these students have taken the calculus-based science which was not required for their Technology degree and may be fairly well-qualified.

Particular attention should be paid to the “proficiency in a computer language” requirement for transfer to EE or CoE. Students with marginal background are advised to postpone taking the required CS 212 (Programming II for Engineers) and instead take CS 211 (Programming I for Engineers) in the fall semester to strengthen their proficiency. These students may then take a General Education course or senior technical elective in the summer to make room in their senior year schedule for CS 212, or stay the summer of their senior year and graduate in August instead of May.

**Financial Aid**

The Financial Aid and Student Records Office are committed to helping students find the resources they need to make their college education affordable.

Visit [http://www.binghamton.edu/financial-aid](http://www.binghamton.edu/financial-aid) where you can find numerous types of aid and valuable information, which includes: First-Time/Transfer Students, Returning Students, Graduate Students, Educational Opportunity Program (EOP), International Students, Financial Aid Appeals, Financial Aid Timeline, Summer Aid, and Accepting your Aid Award. Below are a few things to keep in mind:
• Financial aid offers are determined by information you provide on the Free Application for Federal Student Aid (FAFSA). Students are encouraged to file their FAFSA online via [http://www.fafsa.ed.gov/](http://www.fafsa.ed.gov/). Binghamton University's FAFSA school code is 002836.

• For a fall admission, February 1 is the priority deadline for filing the FAFSA. Students planning to enter in the spring term should file by November 15. If you miss these deadlines, please be aware that you can still file. However, funding for need-based financial aid is limited, and is offered on a first-come, first-served basis.

• New York State residents are eligible for Tuition Assistance Program (TAP) awards. After you file your FAFSA, the information is forwarded to TAP. As a result, you will receive a preprinted Express TAP application. March 1 is the priority deadline for Express TAP applications for the fall. Binghamton University's TAP school code for undergraduates is 0880. The TAP school code for graduate students is 5450.

• To receive federal and/or state funding, students must meet general eligibility criteria established by both agencies and coordinated through the Financial Aid Services Office. In addition, students must attend classes, and be making satisfactory academic progress.

### IV. ACADEMIC POLICIES

The Watson School generally follows the University-wide academic policies which are all available on the Binghamton University website ([http://www.binghamton.edu](http://www.binghamton.edu)). The following policies also apply to Watson School students, who are expected to be familiar with and abide by the regulations that follow.

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

#### Academic Integrity

All students must adhere to the Student Academic Honesty Code of the University and the Watson School (below). The Department of Electrical and Computer Engineering has adopted a standard policy to enforce these codes for violations involving course work.

Category I violations result in a grade of 0 for the graded work plus a one letter course grade reduction. A *Report of Category I Academic Dishonesty* form is filed with the Provost’s Office; if a prior report is already on file, the offense is automatically elevated to Category II. Category II violations result in at least a failing grade for the course plus any additional penalties determined by the Watson Academic Integrity Committee.
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 credits. 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 enroll for fewer than 12 credits without consent and be classified as part time. Students receiving financial aid should check with the Office of Student Financial Aid and Employment Office before becoming part time, because this action may affect aid eligibility.

Requirements for Degrees Statement

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

Students must not be under any disciplinary action at the time of graduation. They must also pay or satisfactorily adjust all fees and bills.

Student Advising

Initial advisement of students begins before the start of the first semester in the Watson School. New student orientations are held for both freshman and transfer students admitted for fall. Transfer students and community college faculty advisers often consult with Watson School advisers prior to student application to ensure appropriate pre-Watson course choices.

After admission, the Watson School departments and the Watson School Advising Office share responsibility for student advisement, with the faculty as the main source of academic guidance. Watson Advising is open year-round during regular business hours and students can visit on a walk-in basis or may schedule appointments with professional advisers. The ECE department has an Undergraduate Program Director who coordinates with Watson Advising to handle specific EE and CoE-related advising issues throughout the year.

For engineering freshman, the Engineering Design Division (EDD) faculty takes the lead through their ongoing contact with the students in the Discovering Engineering and Technical Communications courses. This is supplemented with support from Watson Advising to handle general advising issues.
Upon entry (usually as **sophomores**) into the **EE or CoE program**, each student is assigned to a faculty advisor who will provide guidance throughout the student’s stay at Binghamton. Each faculty advisor follows the guidelines in this handbook to check and monitor the status of a student and when recommending courses. Each semester, during course pre-registration periods, group advising sessions are done by the undergraduate director when visiting sophomore and junior level courses. All students are **encouraged** to meet with their advisor on an individual basis. These meetings have several purposes, including:

- A careful review of the student’s DegreeWorks/DARS report to ensure they are maintaining satisfactory progress towards completion of program and university General Education requirements;
- Review of the student’s course selection for the following semester to ensure prerequisites are met;
- Providing guidance in the selection of technical and professional electives;
- Discussion of academic issues such as GPA, course load, transfer credits, etc.
- Discussion of career path issues and planning for graduate school.

Comments regarding any issues discussed with the student are recorded and notations are made for topics to consider at the next advising session. Additional support from Watson Advising provides ample opportunity for students to address any concern in a timely manner.

### Student Monitoring via Degree Works

**Note to students and faculty advisors**

→ *With regard to fulfilling general education requirements, please seek advising via the Watson Advising Office only.*

→ *Since GenEd requirements are overall university requirements, rather than ECE requirements, the ECE faculty are likely not familiar with the details.*

For students who entered Binghamton University prior to Fall 2013, student monitoring is done by DARS. For students who entered after fall 2013 as a freshman or a transfer student, student monitoring is done by Degree Works.

**Note:** *Since most students using this handbook will have entered after fall 2013, this section only covers student monitoring via Degree Works.*

Questions or problems with the report can be addressed with the student’s faculty advisor, ECE Undergraduate Program Director, and/or Representatives of the Watson Advising Office.

In general, in addition to meeting all University and Program requirements, a student must maintain a minimum 2.0 cumulative GPA, as well as a 2.0 GPA in their major. Each student's progress toward degree completion is monitored continually.
For students, **Degree Works**:

- Provides real-time advice and counsel
- Speeds time to graduation
- Provides intuitive web access to self-service capabilities
- Streamlines the graduation process
- Tracks transfer courses that have been used to fulfill degree requirements
- Notes exceptions or substitutions that have been approved by the Electrical and Computer Engineering Undergraduate Program Director or the ECE Department Chair
- **Monitors 32 required degree credits of math and science as mandated by ABET**
- Allows direct access to multiple related services and advice through hyperlinks to catalog information, class schedules, transcripts, help desk services, and FAQs

**Students use their PODS user name and password** to gain access through BU BRAIN, proceeding to the **Your Records** tab and then clicking **DegreeWorks**.

For advisors, **Degree Works**:

- Supports real-time delivery of academic advice through intuitive web interfaces
- Minimizes errors through consistent degree plans
- Supports more timely degree certification
- Reduces paperwork and manual program check sheets
- Supports and monitors unique program changes

**Faculty advisors use their PODS user name and password** to gain access through BU BRAIN, proceeding to the **Faculty/Staff** tab and then clicking **Degree Works**.

---

**Catalog Year**

The Catalog Year is the most important criterion for making advising judgments since it is the “contract” under which a student has been matriculated. The courses required for graduation are determined by the listings in the appropriate part of the University Catalog for that year. Advisors can find the ECE Physics and Math sections for previous academic years via the university website.

Changes in the ECE curriculum over several catalog years have resulted in the discontinuance/introduction of old/new required courses. Students have the option of changing their catalog year to the most recent year. However, this may not be in the student’s best interest due to the required courses that may have been added recently. Watson Advising has information on all university-wide changes that occur.
Advanced Placement Credit

External examination credit includes credits earned through Advanced Placement (AP), International Baccalaureate (IB), College Level Examination Program (CLEP) credits, or through official transcript evaluation of courses taken at other institutions. Selected external credits may apply to General Education or major requirements as specified. Advanced Placement examinations with a grade of 3 or better are approved for credit, with the amount and applicability determined by the appropriate academic unit. There is a maximum of 32 credits allowed for AP transfer credit.

See Frequently Asked Questions regarding GenEd credits: [http://www.binghamton.edu/general-education/faq-students.html#exam](http://www.binghamton.edu/general-education/faq-students.html#exam)

<table>
<thead>
<tr>
<th>AP Exam</th>
<th>Equivalency (4 credits unless otherwise stated)</th>
<th>General Education Requirement Fulfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>American History</td>
<td>Score 3, 4 or 5 – elective credit</td>
<td>Social Science (N)</td>
</tr>
<tr>
<td>Art History</td>
<td>Score 3 – elective credits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Score 4 or 5 – ARTH 101</td>
<td>Aesthetics (A)</td>
</tr>
<tr>
<td>Art Studio (Drawing)</td>
<td>Score 3, 4 or 5 – elective credit</td>
<td></td>
</tr>
<tr>
<td>Art Studio (General)</td>
<td>Score 3, 4 or 5 – elective credit</td>
<td></td>
</tr>
<tr>
<td>Biology</td>
<td>Score 3 – elective credit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Score 4 – either BIOL 117 or 118 See the Biology faculty advisor for assistance in deciding.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Score 5 – BIOL 117 and BIOL 118 (8 credits)</td>
<td>Under some circumstances, the GenEd lab requirement may be fulfilled with AP credit. [More Info]</td>
</tr>
<tr>
<td>Calculus A B</td>
<td>Score 3 or 4 - students who entered Harpur College before fall 2011: unspecified lower-level math</td>
<td>Math / Reasoning(M)</td>
</tr>
<tr>
<td></td>
<td>Score 3 or 4- students who enter Harpur College fall 2011 and later: MATH 220</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Score 5 - Math 221 + 4 unspecified lower-level math (8 credits)</td>
<td></td>
</tr>
<tr>
<td>Calculus B C</td>
<td>Score of 3 - students who entered Harpur College before fall 2011: unspecified lower-level Math</td>
<td>Math / Reasoning (M)</td>
</tr>
<tr>
<td></td>
<td>Score of 3- students who enter Harpur College fall 2011 and later: MATH 220</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Score of 4 - Math 221</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Score of 5 - Math 221 + 4 additional credits of unspecified lower-level math (8 credits)</td>
<td></td>
</tr>
<tr>
<td>AP Exam</td>
<td>Equivalency (4 credits unless otherwise stated)</td>
<td>General Education Requirement Fulfilled</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Chemistry                  | • Score 3 – CHEM 101  
• Score 4 – CHEM 107 or 111  
• Score 5 – CHEM 107 and CHEM 108 (8 credits) | Under some circumstances, the GenEd lab requirement may be fulfilled with AP credit. (More Info)         |
| Chinese Language & Culture | Score 3, 4 or 5 - elective credit  
Foreign Language                                                                                           |                                                                                                       |
| Computer Science A         | Score 3, 4 or 5 – elective credit  
Note: Does not fulfill Gen Ed                                                                                     |                                                                                                       |
| Economics Micro            | Score 3, 4 or 5 – ECN 160  
Social Science (N)                                                                                               |                                                                                                       |
| Economics Macro            | Score 3, 4 or 5 – ECN 162  
Social Science (N)                                                                                               |                                                                                                       |
| English: Literature & Composition | Score 3, 4 or 5 – elective credit  
Humanities (H) Note: Does not fulfill Gen Ed or Harpur Writing requirement                                    |                                                                                                       |
| English: Language & Composition | Score 3, 4 or 5 – elective credit  
Note: Does not fulfill Gen Ed or Harpur Writing requirement                                                        |                                                                                                       |
| Environmental Studies      | Score 3, 4 or 5 – ENVI 101  
Under some circumstances, the GenEd lab requirement may be fulfilled with AP credit. (More Info)             |                                                                                                       |
| European History           | Score 3, 4 or 5 – elective credit  
Social Science (N)                                                                                               |                                                                                                       |
| French Language            | Score 3, 4 or 5 – elective credit–Consult the dept. if you plan to take additional courses  
Foreign Language                                                                                           |                                                                                                       |
| French Literature          | Score 3, 4 or 5 – FREN 215–Suggested courses: Score 3 or 4: FREN 241, 244, 251 or 341;  
Score 5 – FREN 361 or 362  
Humanities (H)  
Foreign Language                                                                                           |                                                                                                       |
| Human Geography            | Score 3, 4 or 5 – GEOG 101  
Social Science (N)                                                                                               |                                                                                                       |
| German Literature          | Score 3 or 4 - elective credit  
Score 5 – GERM 203 and GERM 204-Consult with department; may be used towards major  
Humanities (H)  
Foreign Language                                                                                       |                                                                                                       |
| Italian Language & Culture | Score 3, 4 or 5—elective credit  
Foreign Language                                                                                                 |                                                                                                       |
| Japanese Language & Culture| Score 3, 4 or 5—elective credit  
Foreign Language                                                                                                 |                                                                                                       |
| Latin Literature           | Score 3, 4 or 5 – elective credit–Consult with Classical and Near Eastern Studies Department to determine whether this may count toward the major  
Humanities (H)  
Foreign Language                                                                                       |                                                                                                       |
| Latin: Virgil              | Score 3, 4 or 5 – elective credit–Consult with Classical and Near Eastern Studies Department to determine whether this may count toward the major  
Foreign Language                                                                                       |                                                                                                       |
| Music                      | Score 3, 4 or 5—elective credit  
Aesthetics (A)                                                                                                     |                                                                                                       |
| Music Theory               | Score 3, 4 or 5—elective credit  
Aesthetics (A)                                                                                                     |                                                                                                       |
| Physics B                  | • Score 3 or 4 – elective credit  
Foreign Language                                                                                                 |                                                                                                       |
<table>
<thead>
<tr>
<th>AP Exam</th>
<th>Equivalency (4 credits unless otherwise stated)</th>
<th>General Education Requirement Fulfilled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics C</td>
<td>• Score 5 – PHYS 121 and PHYS 122 (8 credits)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Score 3 or 4 on Mech and/or E-M sections - elective credit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Score 5 on Mech section – PHYS 131</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Score 5 on E-M section – PHYS 132</td>
<td></td>
</tr>
<tr>
<td>Political Science American</td>
<td>Score 3, 4 or 5 – PLSC 111</td>
<td>Social Science (N)</td>
</tr>
<tr>
<td>Political Science Comparative</td>
<td>Score 3, 4 or 5 – PLSC 113</td>
<td>Social Science (N)</td>
</tr>
<tr>
<td>Psychology</td>
<td>• Score 3 - elective credit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Score 4 or 5 – PSYC 111</td>
<td>Note: Does not fulfill Gen Ed</td>
</tr>
<tr>
<td>Spanish Language</td>
<td>Score 3, 4 or 5 – elective credit</td>
<td>Gen Ed Foreign Language</td>
</tr>
<tr>
<td></td>
<td>Score 3, 4 or 5 = SPAN 215</td>
<td></td>
</tr>
<tr>
<td>Spanish Literature</td>
<td><strong>Suggested placement:</strong>&lt;br&gt;-Score of 3 or 4: SPAN 250 or 251&lt;br&gt;-Score of 5: SPAN 360&lt;br&gt;Consult with Romance Language Department.</td>
<td>Humanities (H) Gen Ed Foreign Language</td>
</tr>
<tr>
<td>Statistics</td>
<td>Score 3, 4 or 5 – MATH 147A</td>
<td>Math/Reasoning (M)</td>
</tr>
<tr>
<td>World History</td>
<td>Score 3, 4 or 5 – elective credit</td>
<td>Social Science (N)</td>
</tr>
</tbody>
</table>

**International Baccalaureate (IB) Program**

The following all-University policy applies to entering students who have completed the International Baccalaureate diploma: such students will receive a full year’s credit (32 credit hours) if they have achieved a total of 30 or more points on the IB diploma and have passed at least 3 higher level exams with scores of 5 or higher. However, due to the curricular requirements of EE and CoE degrees, only 8 of these credits are likely to apply to the degree. Specifically, the General Education Social Sciences (N) requirement and the Humanities (H) requirement will be fulfilled by the IB degree. For other students who have participated in the IB program, 8 (eight) credit hours will be given for each higher level exam passed with a score of 6 or 7. For higher level exams passed with a score of 4 or 5, 4 (four) credit hours will be given. The number of these credits that apply to the EE or CoE degrees will depend on the specific IB courses taken.
CLEP (College Level Examination Program)

CLEP is a credit exam program run by the College Board and ETS. ACE recommends 3-6 credits for each subject (however, Binghamton University grants 4) with a minimum or credit granting score of 50 or higher. This is considered equivalent to a grade of “C” or better. Of the 2 types of exams, subject and general, only the subject is considered for credit. The credit granting score has been standardized to 50 for all subject exams. Only 4 credits are awarded for the 6 credit recommendations and 8 credits for 12 credit recommendations.

Watson General Education Requirements

All newly admitted Watson School students are subject to the General Education requirements. The chart below explains what is required and what the EE or CoE curriculum fulfills. Requirements can be completed in any order before graduation.

**Watson School GenEd Requirements - Engineering Majors Only**

<table>
<thead>
<tr>
<th>General Education Requirement</th>
<th>Course That You Use To Fulfill It</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition course (C)</td>
<td>Covered by (J)</td>
</tr>
<tr>
<td>Oral Communication (O)</td>
<td>Senior Design Sequence</td>
</tr>
<tr>
<td>Joint Oral Communication/Composition (J) (Courses satisfy both the C and O simultaneously)</td>
<td>WTSN Freshman Sequence</td>
</tr>
<tr>
<td>Pluralism in the U.S. (P)</td>
<td>***</td>
</tr>
<tr>
<td>Global Interdependencies (G)</td>
<td>***</td>
</tr>
<tr>
<td>Laboratory Science (L)</td>
<td>Chemistry 111 (Also Physics 131)</td>
</tr>
<tr>
<td>Social Science (N)</td>
<td>***</td>
</tr>
<tr>
<td>Mathematics/Reasoning (M)</td>
<td>Calculus I</td>
</tr>
<tr>
<td>Aesthetics (A)</td>
<td>***</td>
</tr>
<tr>
<td>Humanities (H)</td>
<td>***</td>
</tr>
<tr>
<td>Physical Activity (Y)</td>
<td>***</td>
</tr>
<tr>
<td>Wellness (S)</td>
<td>***</td>
</tr>
<tr>
<td>Physical Activity/Wellness (B) (Combination of Y and S)</td>
<td>***</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>Waived for Engineering Only</td>
</tr>
</tbody>
</table>

*** course suggestions in the pages that follow ***
Learning Outcomes for General Education Requirements  
(Revised 11/8/11)

(C) requirement - Composition

Students in C courses will demonstrate:

1. The ability to write effectively and coherently, in ways appropriate to the discipline and the level of the course.
2. The ability to revise and improve their writing in both form and content.

[Requirement satisfied during freshman year Watson sequence, (J).]

(O) requirement - Oral Communication

Students in O courses will demonstrate:

1. Proficiency in oral presentations.
2. The ability to improve oral presentations in response to critiques.
3. Skill in listening to and critiquing oral presentations.

[Requirement satisfied during Senior Design sequence.]

Foreign Language Requirement

Students who satisfy the Foreign Language requirement will demonstrate:

1. Basic proficiency in the understanding and use of a foreign language.
2. Knowledge of the distinctive features of cultures(s) associated with the languages they are studying.

[Requirement waived for Engineering ONLY.]

(G) requirement - Global Interdependencies

Students in G courses will demonstrate knowledge of how two or more distinctive world regions have influenced and interacted with one another and how such interactions have been informed by their respective cultures or civilizations.

[Freshman year, fall semester elective. Examples: GEOG 101: Introduction to Geography; HIST 130A: Modern World History; SOC 100A: Social Changes: Introduction to Sociology.]
(P) requirement - Pluralism in the United States

Students in all P courses will demonstrate an understanding of:

1. United States society from the perspective of three or more groups that constitute that society, including at least three of the following groups: African Americans, Asian Americans, European Americans, Latino Americans, and Native Americans.
2. How these groups have affected and been affected by basic institutions of American society, such as commerce, family, legal and political structures, or religion.

In addition, students who have not scored 85 or above on the New York State Regents examination in United States history (or its equivalent) must take a P course where they also will demonstrate knowledge of:

3. An historical narrative of the United States and its institutions over a period of at least a century, including connections to prior and subsequent periods, with this narrative including several themes that have shaped the development of American society, such as the struggle for democracy, citizenship, racial and gender inequality, religious freedom, and civil rights; the conflicts that have erupted over these issues; and the consensus, if any, that has been reached on each of them.
4. How the history of the United States relates to the history of at least two other regions of the world, as a means of understanding America's evolving relationship with the rest of the world.

[Freshman year, spring semester elective. Examples: GEOG 103: Multicultural Geographies of the U.S.; HIST 104A: Modern American Civilization; PLSC 111: Introduction to American Politics.]

(A) requirement - Aesthetics

Students in A courses will demonstrate an understanding of the creative process and the role of imagination and aesthetic judgment in at least one principal form of artistic expression in such fields as art, art history, cinema, creative writing, dance, graphic design, music, and theater.


(H) requirement - Humanities

Students in H courses will demonstrate an understanding of human experience through the study of literature or philosophy.
(L) requirement - Laboratory Science

Students in L courses will demonstrate:

1. Understanding of the methods scientists use to explore natural phenomena, including the formulation and testing of hypotheses and the collection, analysis and interpretation of data.
2. Knowledge of concepts and models in one of the sciences.

[Requirement satisfied with CHEM 111 and or PHYS 131.]

(N) requirement - Social Sciences

Students in N courses will demonstrate:

1. Knowledge of major concepts, models, and issues (and their interrelationships) of at least one of the social sciences: anthropology, economics, geography, history, political science, or sociology.
2. An understanding of the methods used by social scientists to explore social phenomena, including, when appropriate to the discipline, observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and analysis by mathematics or other interpretive frameworks.

(S) requirement - Wellness

Students in S courses will demonstrate knowledge of such topics as diet and nutrition, physical development, substance abuse, human sexuality, stress and stress reduction techniques, relaxation methods, or the characteristics that define physical, mental or emotional fitness/wellness.

[Example of S: HWS 112: Love Thyself; HWS 233: Stress Management.]
**Y** requirement - Physical Activity

Students in Y courses will demonstrate one or more of the following attributes: neuromuscular coordination, muscular strength and muscular endurance, cardiorespiratory endurance, or flexibility.

[Example of Y: AAAS 380Q: Dances of South Asia; OUT 130; English Horsemanship.]

**Grading System**

Students who enroll in courses offered outside of Watson School undergraduate programs are graded according to the grading system of the school offering the course. Watson School undergraduate courses are graded in one of two ways:

- A, A–, B+, B, B–, C+, C, C–, D, F, W, or
- Pass/Fail.

Students normally choose the letter grade 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. Only courses taken with a letter grade option can be used to satisfy program requirements (except for general education courses that are only offered pass/fail).

**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 are made to an undergraduate record after two years have passed.

*Add/Drop Deadline:* The add/drop deadline is midnight on the Friday of the second week of classes.

*Course Withdrawal:* The course-withdrawal period extends from the drop deadline until the end of the ninth week. Students who drop courses online during this period will receive a grade of “W,” which does not count toward the student’s grade point average. Deadlines for summer courses and variable-credit courses are adjusted accordingly and can be completed only through the Office of Student Records, located in the Admissions Center.

Note: If a late add or drop request is approved via workflow because of extraordinary circumstances, the Student Accounts Office imposes a late add/drop fee.

**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 approved by the instructor, the student may request an extension using a form available from Watson Advising. 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.”

### Watson School Policy for Course Withdrawal after the Official University Withdrawal Deadline

Under extraordinary circumstances, a student may seek withdrawal from a course after the withdrawal deadline. The electronic form can be found on BU Brain under the **Student** tab/registration. The request is sent directly to the instructor for further processing. You can monitor the progress of your request via BU Brain. You will be notified via email if further information is needed or of the final decision.

### 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:

<table>
<thead>
<tr>
<th>Grade</th>
<th>GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>A–</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B–</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>C–</td>
<td>1.7</td>
</tr>
<tr>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>F</td>
<td>0.0</td>
</tr>
</tbody>
</table>

#### Repeating Courses

For undergraduates, a D grade is considered passing. However, some students are advised to retake a passed course. While students may retake a course in which a passing grade was earned, only the first passing grade counts toward degree progress, but both show on the transcript. The retaken course is not considered part of the normal 12 credits required for full-time status and it is not calculated into the grade-point average. When a course is repeated in which the student earned a failing grade the first time, the retaken course counts toward the rate of degree progress. The two grades are calculated into the grade-point average and both show on the student transcript.

#### Academic Honors

Students who complete any given semester with a **3.5 or better GPA** and are currently enrolled in 12 credits, are placed on the Dean’s Honors List. This honor is noted on the permanent transcript.
For graduation honors, the criteria are:

- 3.50-3.69 GPA: cum laude
- 3.70-3.84 GPA: magna cum laude
- 3.85-4.00 GPA: summa cum laude

**Academic Probation and Suspension**

*Probation:* Students who’s cumulative GPA for courses taken at Binghamton falls below 2.0 are placed on academic probation for the following semester, and are subject to the following restrictions:

- They may not register for more than 14 credit hours.
- They may not campaign for or accept any campus office or committee chairmanship.

Students are removed from probation when the achieved cumulative GPA is 2.0 or above. Academic probation does not preclude students from receiving financial aid.

*Suspension:* Students on academic probation who again fail to meet both the 2.0 cumulative GPA and the last-semester GPA in the table below are suspended. Students who meet the last-semester GPA requirement but still post a cumulative GPA under 2.0 remain on academic probation.

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

<table>
<thead>
<tr>
<th>Hours Attempted</th>
<th>Last Semester GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-16</td>
<td>2.0</td>
</tr>
<tr>
<td>17-32</td>
<td>2.1</td>
</tr>
<tr>
<td>33-48</td>
<td>2.1</td>
</tr>
<tr>
<td>49-64</td>
<td>2.2</td>
</tr>
<tr>
<td>65+</td>
<td>2.3</td>
</tr>
</tbody>
</table>

*Dismissal:* Students who, after being suspended and readmitted, once again fail to meet the required academic standards are dismissed. The Undergraduate Studies Committee will hear a single appeal of dismissal after demonstration of significant changes. Appeals of such decisions are referred to the dean.

For the purpose of determining academic standing, credits earned prior to matriculation in Watson School may be reviewed.
Academic actions (suspension, probation, honors) are completed by the Watson Advising Office at the end of each semester, with suspension, dismissal and honors letters signed and reviewed by the Dean’s Office.

Withdrawal and Re-enrollment

Undergraduate students who withdraw from the Watson School during any semester and wish to remain in good standing must follow a formal withdrawal procedure. Mere absence from class does not constitute withdrawal. Students can access the late withdrawal form through BU BRAIN. It is advised to first speak with or meet with a representative from the Watson Advising office. After the proper paperwork is submitted and approved, 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 re-enrollment 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 re-enrollment through the Undergraduate Admissions Office if they have not been in attendance for two or more semesters. Re-enrollment forms are available on the Binghamton University website or by phone request to the Office of Undergraduate Admissions.

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.

Final Examinations

Students are not expected to take more than three (3) final examinations in a twenty-four hour period. Immediately after review of their schedule, students should contact the faculty and attempt to resolve this on their own. If a resolution cannot be reached, the student should work with Watson Advising.

Change of Grade

Change of grade after submission to the Office of Student Records, by the instructor, is to be made only in the case of a makeup of a grade of Incomplete or as a result of clerical error. The instructor must submit the Change of Grade form directly to the Registrar. Change of Grade forms have a stamped # or serial number on the form that should be recorded in the instructor’s grade sheet.
Application for Degree and Commencement Participation

In order to graduate at the end of the semester, a student must submit an Application for Undergraduate Degree form and a Commencement Participation form. Forms are available at http://www.binghamton.edu/commencement/ and should be filled out prior to the withdraw deadline of their final semester. These forms are used by the Office of Student Records to be sure the student receives various important notices in preparation for graduation.

V. ACADEMIC PROGRAMS

Core Curricula: Electrical and Computer Engineering

The following section outlines the core curricula for the Bachelor of Science in Electrical Engineering and the Bachelor of Science in Computer Engineering degrees. Students who enroll as aspiring engineering freshman in the Watson School are initially under direction of the Division of Engineering Discovery and Design. The goal of this division is to provide students the opportunity to develop the skills required for success as students today and as leaders tomorrow - no matter which final profession they choose. The freshman year is common to all engineering majors.

**Freshman Year / Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 221</td>
<td>Calculus I (M)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 111</td>
<td>Chemical Principles (L)</td>
<td>4</td>
</tr>
<tr>
<td>WTSN 103</td>
<td>Engineering Communications I</td>
<td>2</td>
</tr>
<tr>
<td>WTSN 111</td>
<td>Introduction to Engineering Design</td>
<td>2</td>
</tr>
<tr>
<td>General Education Elective (P)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Body/Wellness Requirement (S, B)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

**Freshman Year / Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 222</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 131</td>
<td>General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>WTSN 104</td>
<td>Engineering Communications II</td>
<td>2</td>
</tr>
<tr>
<td>WTSN 112</td>
<td>Introduction to Engineering Analysis (J)</td>
<td>2</td>
</tr>
<tr>
<td>General Education Elective (G)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Body/Wellness Requirement (S, B)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

**Total Credits – 1st year:** 34

To receive the BS EE or BS CoE degree, students must complete a minimum of 125 credit hours covering all degree requirements with a cumulative grade-point average of at least 2.0, plus a minimum of 2.0 in the core requirements for Electrical or Computer Engineering. (Most students complete with more than the minimum number of credits required, with 125 credits allowing for variances in transfer credits from other institutions.) In addition, all Binghamton University students must also meet the General Education requirements.
# Electrical Engineering Curriculum: Final Three Years

## Sophomore Year / Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 371</td>
<td>Ordinary Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 132</td>
<td>General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>CS 211</td>
<td>Programming I for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>EECE 251</td>
<td>Digital Logic Design</td>
<td>4</td>
</tr>
<tr>
<td>EECE 281</td>
<td>ECE Seminar I</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td></td>
</tr>
</tbody>
</table>

## Sophomore Year / Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 212</td>
<td>Programming II for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>ISE 261</td>
<td>Probabilistic Systems I</td>
<td>4</td>
</tr>
<tr>
<td>EECE 287</td>
<td>Sophomore Design</td>
<td>4</td>
</tr>
<tr>
<td>EECE 260</td>
<td>Electric Circuits</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

## Junior Year / Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 301</td>
<td>Signals and Systems</td>
<td>4</td>
</tr>
<tr>
<td>EECE 315</td>
<td>Electronics I</td>
<td>4</td>
</tr>
<tr>
<td>EECE 332</td>
<td>Semiconductor Devices</td>
<td>3</td>
</tr>
<tr>
<td>MATH 323</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>EECE 382</td>
<td>ECE Seminar II</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

## Junior Year / Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 323</td>
<td>Electromagnetics</td>
<td>4</td>
</tr>
<tr>
<td>EECE 361</td>
<td>Control Systems</td>
<td>3</td>
</tr>
<tr>
<td>EECE 377</td>
<td>Communication Systems</td>
<td>3</td>
</tr>
<tr>
<td>EECE 387</td>
<td>Design Lab</td>
<td>4</td>
</tr>
<tr>
<td>Professional Elective I</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td></td>
</tr>
</tbody>
</table>

## Senior Year / Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 487</td>
<td>Senior Project I (O)*</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective I</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Education (H) Requirement</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>General Education (A) Requirement</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td></td>
</tr>
</tbody>
</table>

## Senior Year / Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 488</td>
<td>Senior Project II*</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective II</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Professional Elective II</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Education (N) Requirement</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Total Credits – 4 years** | **127** |

27
# Computer Engineering Curriculum: Final Three Years

## Sophomore Year / Fall Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 371. Ordinary Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 132. General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>CS 211. Programming I for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>EECE 251. Digital Logic Design</td>
<td>4</td>
</tr>
<tr>
<td>EECE 281. EECE Seminar I</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

## Sophomore Year / Spring Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 212. Programming II for Engineers</td>
<td>4</td>
</tr>
<tr>
<td>ISE 261. Probabilistic Systems I</td>
<td>4</td>
</tr>
<tr>
<td>EECE 287. Sophomore Design</td>
<td>4</td>
</tr>
<tr>
<td>EECE 260. Electric Circuits</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

## Junior Year / Fall Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 301. Signals and Systems</td>
<td>4</td>
</tr>
<tr>
<td>MATH 314. Discrete Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>EECE 315. Electronics I</td>
<td>4</td>
</tr>
<tr>
<td>EECE 351. Digital Systems Design</td>
<td>4</td>
</tr>
<tr>
<td>EECE 382. EECE Seminar II</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

## Junior Year / Spring Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 359. Computer and Networks</td>
<td>4</td>
</tr>
<tr>
<td>EECE 352. Computer Architecture</td>
<td>3</td>
</tr>
<tr>
<td>EECE 387. Design Lab</td>
<td>4</td>
</tr>
<tr>
<td>General Education (H) Requirement</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

## Senior Year / Fall Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 487. Senior Project I (O)*</td>
<td>3</td>
</tr>
<tr>
<td>CS 311. Operating Systems Concepts</td>
<td>4</td>
</tr>
<tr>
<td>Technical Elective I</td>
<td>3</td>
</tr>
<tr>
<td>General Education (A) Requirement</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

## Senior Year / Spring Semester
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 488. Senior Project II*</td>
<td>3</td>
</tr>
<tr>
<td>Professional Elective I</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective II</td>
<td>3</td>
</tr>
<tr>
<td>General Education (N) Requirement</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

**Total credits – 4 years** 126

* EECE 487 and 488 will continue to be 4 cr. each until fall 2015
**Electives**

For the EE curriculum, a total of two (2) technical electives and two (2) professional electives are required. For the CoE curriculum, a total of two (2) technical electives and one (1) professional elective are required. This section gives guidance on approved technical and professional electives. Students may also obtain permission to take other electives from their advisor, provided a strong case is made.

**Pre-Approved Technical Electives for EE Majors**

- EECE 400 – 486;
- Non-required core courses:
  - EECE 351: Digital Systems Design
  - EECE 352: Computer Architecture
  - EECE 359: Computer Communications and Networking

**Pre-Approved Technical Electives for CoE Majors**

- Non-required CS courses; CS 231 – 481;
- EECE 400 – 486;
- Non-required core courses:
  - EECE 323: Electromagnetics
  - EECE 332: Semiconductor Devices
  - EECE 361: Control Systems
  - EECE 377: Communications Systems

**Pre-Approved Professional Electives for EE and CoE Majors**

<table>
<thead>
<tr>
<th>ACCT</th>
<th>321 – 475</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTR</td>
<td>321 – 475</td>
</tr>
<tr>
<td>BCHM</td>
<td>321 – 475</td>
</tr>
<tr>
<td>BIOL</td>
<td>321 – 475</td>
</tr>
<tr>
<td>CHEM</td>
<td>231 – 499</td>
</tr>
<tr>
<td>CS</td>
<td>300 – 390, 400 – 472</td>
</tr>
<tr>
<td>ECON</td>
<td>321 – 475</td>
</tr>
<tr>
<td>EECE</td>
<td>323 – 377 (EE only), 400 – 486, 491, 496</td>
</tr>
<tr>
<td>GEOG</td>
<td>321 – 475</td>
</tr>
<tr>
<td>GEOL</td>
<td>321 – 475</td>
</tr>
<tr>
<td>ISE</td>
<td>211, 231, 300 – 486</td>
</tr>
<tr>
<td>MATH</td>
<td>300 – 389, 400 – 489 (except Math 327 &amp; 447)</td>
</tr>
<tr>
<td>ME</td>
<td>273, 274, 300 – 494</td>
</tr>
<tr>
<td>MGMT</td>
<td>321 – 475</td>
</tr>
<tr>
<td>PHYS</td>
<td>323 – 342, 411 – 474</td>
</tr>
</tbody>
</table>

*Any course not listed as a **Technical or Professional Elective requires signed approval from a Faculty Advisor on a Degree Works/DARS Exception Form – available from the Watson School Advising Office or the ECE department front office.*
Course Substitutions

Appropriate substitutions for required courses can usually be found among the ECE senior technical electives. Exact substitutions are not necessary, as long as the substitute course fits in with the student’s program. Occasionally, a substitution for an existing required course is requested in the last semester in order to allow a student to graduate without staying an extra semester, usually as a result of having dropped a course.

All course substitutions require a Degree Works/DARS Exception Form, which can be found at the Office of Watson Advising or the ECE Department. Any significant deviation from the published requirements requires a General Academic Petition Form. All forms must include the proper signatures.

Taking Graduate Courses as an Undergraduate

In their last semester, seniors may have the prerequisites and motivation to take a graduate course for undergraduate credit. In order to do so, permission of the instructor is required. After gaining permission, an email from the instructor should be sent to the ECE department secretary, Ms. Shelie VanKuren, who can then enroll the undergraduate student in the graduate course.

Undergraduate students who are within eight credits of graduation may register for up to two graduate-level courses and receive graduate credit, provided the graduate courses are not used to meet the undergraduate degree requirements. (These courses are offered at undergraduate tuition rates when the student is within eight credit hours of graduation and files the necessary form.) When graduate courses are not taken with the intent of fulfilling undergraduate requirements, such graduate hours do not count toward full-time status for financial aid purposes. Thus, undergraduates taking graduate courses may not be eligible for certain types of financial aid.

To receive graduate credit for such courses, the undergraduate student must complete the Petition to Receive Graduate Credits as an Undergraduate form (available from the Registrar or the Graduate School). The form is then filed with the Registrar and the Student Accounts Office before registration.

While graduate courses taken by undergraduates (and not used to meet undergraduate degree requirements) will appear on the undergraduate transcript, these courses are not counted toward the undergraduate degree or used in the calculation of the final GPA. The credits may be counted toward the graduate degree.

An exception to these policies is made for undergraduate students admitted to combined bachelor’s/master’s degree programs.
Courses at Other Institutions

Any Watson School student who wishes to take a course at another institution and use it towards any degree requirement must seek both department and Watson School Advising Office pre-approval on a Petition to Take Courses at Another Institution form to insure proper transfer credit with the minimum required grade. An official course description is required (i.e., copy of catalog description, web link, etc.) prior to approval and a copy of the signed form is kept in both the Watson School Advising Office and the department. Evaluation of the suitability of transfer credits follows the same process as evaluation of transfer credits. Upon receipt by the Watson Advising Office, an official transcript matching the pre-approved course, the student is awarded credit for the course if they have achieved the minimum required grade.

Independent Study, Industrial Internship, Undergraduate Research and Teaching Practicum

EECE 491 (Teaching Practicum), EECE 496 (Industrial Internship), EECE 497 (Independent Study), and EECE 499 (Undergraduate Research) can be used to satisfy the Professional Elective requirement (see full course descriptions in Section VI).

EECE 491 – Teaching Practicum

Students majoring in electrical or computer engineering are encouraged to work with faculty advisors as course assistants in laboratory classes. Normally, near the end of each academic semester, a solicitation for course assistants for the following semester is made. To be eligible, students must be in good academic standing overall and have already earned at least a B grade in the course for which they are assisting. Students should register for EECE 491 – Teaching Practicum for up to 4 credits (typically 3), as agreed to with the faculty supervisor for the course. Teaching Practicum may count for one professional elective but may normally not be used to satisfy a technical elective unless significant work is done and always at the discretion of the Chair or Undergraduate Program Director. Although the student may enroll for a second teaching practicum, only the first practicum can be counted toward degree requirements.

Students may assist in a course in a number of ways, depending on the nature of the course and the needs of the instructor teaching the course. The exact role of the student is determined in consultation with the instructor. In all cases, however, the student must actively participate in the teaching/learning process. For example, it is not sufficient for the student to simply grade papers. Generally, the number of direct contact hours with students should be at least equal to the number of credits being taken (e.g. 3 hours assisting in lab). However, the total hours per week should be closer to 3 to 4 times the number of credits to match a typical class.
EECE 496 – Industrial Internship

Internships, either in the Binghamton area or elsewhere, are highly encouraged by the Department of Electrical and Computer Engineering. At the discretion of the faculty advisor, one internship may be applied toward up to 3 credits of EECE 496 Industrial Internship; subsequent internships can be taken with a pass/fail option only. The 3 credits of EECE 496 taken with normal grade option (W grade mode) may be used to fulfill the requirements for one professional elective. Internships may not be used as a technical elective and may not be used for more than one professional elective. In order to receive academic credit, students must complete the Internships as a Professional Elective form (purple) which can be found at the ECE department front office. The form requires basic information about the internship, such as the sponsoring organization, dates, and nature of work to be done. The processing of this form should be initiated by the student prior to the start of the internship period. At the end of the internship, the employer or sponsoring organization will be asked to comment about the work actually done and give a brief rating of the quality of the work performed by the student, which will be sent directly to the ECE department for processing. Internships require course registration during the same term or semester as the internship is being completed (e.g., internships completed during the summer months would require summer registration).

Enrollment in EECE 491, 496, 497, and 499

For a student to enroll in an Independent Study, Industrial Internship, Undergraduate Research, or Teaching Practicum, registration on an Independent Study Form (yellow for 491, 497, and 499; purple for 496) obtained from their respective department is required and all are taken with a normal grade option (system default ‘W’ which means Watson letter grade) if using to satisfy a technical or professional elective. Students cannot register for these courses using BU Brain. The form is to be filled out by the student and signed by the instructor overseeing the specified course. Once done, the form is processed through the ECE front office staff.

Dual Majors or Minors in Electrical and Computer Engineering

Dual Major Students may elect to double major in both electrical and computer engineering, subject to the following general guidelines:

- Students must take all required “major” courses for each major and at least 32 “major” credits beyond the minimum required for either major alone. Typically, the double major would require approximately 157 to 160 total credits and requires 5 years to complete.

- For the CoE “home” major, additional courses would include EECE 323, 332, 361, 377, Math 323, two additional technical electives, and two additional professional electives.
• For the EE “home” major, additional courses would include EECE 351, 352, 359, CS 311, Math 314, two additional technical electives, and one additional professional elective.

Minor in Sustainability Engineering – only for engineering majors

Applications are available in the Watson School Advising Office. For the application, additional information, and a list of minor approved elective courses, visit:

http://www.binghamton.edu/engineering-design/academic-programs/sustainability-minor.html

Courses, (excluding prerequisites), used to fulfill requirements for the major cannot be used as courses satisfying requirements for a minor. However, the courses may be used to satisfy GenEd requirements.

Listed below is a summary of the minor requirements. For EE or CoE students seeking the minor in sustainability, it requires a total of 21 additional credits.

• Prerequisite Courses (16 credit hrs.) must be acquired prior to declaring a minor
  
  Math (8 credit hrs.): Calculus I (MATH 221) and Calculus II (MATH 222)
  Chemistry (4 credit hrs.): Chemistry I (CHEM 111), or (CHEM 107 and 108)
  Physics (4 credit hrs.): General Physics I (PHYS 131)

• Required Core Courses (9 credit hrs.)
  
  BE 305, Introduction to Sustainable Engineering and Design (3 credit hrs.)
  BE 306, Engineering Sustainable Energy (3 credit hrs.)
  BE 307, Sustainable Development: Ecosystems for Engineers (3 credit hrs.)

• Required elective courses (12 credit hrs.)
  
  Courses must be from at least two different departments and at least two of the elective courses must be at the advanced undergraduate level (i.e., 300 or 400).

Note: Courses may be added to the approved elective course list in the future.

Study Abroad

The ECE department encourages students to study abroad for a semester, a summer, or shorter period of time. Opportunities well-suited for engineering students may be found at:

Please bear in mind, however, that all required junior year core courses must be taken at Binghamton University.

**Accelerated Master’s Degree Programs for Students Pursuing the BS in Electrical Engineering or BS in Computer Engineering**

**BS/MSEE**

A combined **BS and MSEE** degree program is available for motivated students working toward the BS in electrical or computer engineering. The MS degree is an excellent professional credential, which usually commands a substantially higher starting salary. The combined program offers the advantage of less time to degree completion, finishing the MS while a full-time student rather than an extended part-time program, and the ability to start employment at the Master's level. To be eligible, undergraduate students must have a GPA of **3.5 or higher** after five semesters (fall semester, junior year); students with a GPA above 3.2 (but below 3.5) can be admitted with two signatures of support from ECE faculty (submitted to the ECE graduate program director); students with a GPA above 3.0 (but below 3.2) may be admitted at the discretion of the graduate program director with two signatures of support from ECE faculty (submitted to the ECE graduate program director).

Students apply for admission to the combined-degree program during their junior year by completing a short application available in the ECE front office. Once admitted to the program, students begin taking graduate courses during their senior year. Up to three graduate courses taken in the student’s senior year can count both toward their MS degree requirements and their senior elective requirements (students may not take more than three graduate classes as an undergraduate). Students in this program must be register for a total of 21 graduate credits during their fifth (graduate) year (a total of 7 courses). By January 15 of the senior year, a formal application for Graduate School admission must be completed, which assuming continued good performance, is only a formality.

After admission to the graduate program, students are encouraged to seek employment as a graduate research assistant in one of the department’s research projects. The research experience gained in the summer after finishing the BS degree provides an excellent experience and a start on an MS thesis project. Typically this start on the MS thesis allows the completion of the MS thesis option in one academic year beyond the BS degree. The expectation is that students in the program will complete the BS and MS degrees in five years. Students in the combined-degree program receive their BS degree after completing their undergraduate requirements. They must then continue as a full-time student in order for the graduate courses taken as an undergraduate to count toward the MS degree requirements.

**Watson /SoM Fast-Track MBA program**

A combined **Bachelor of Science (BS) and Master in Business Administration (MBA)** degree program provide Watson undergraduate students with the
opportunity to complete their BS degree and MBA degree within five years. In order to complete this program, students will be required to apply during their junior year and take four MBA courses during the senior year, as seen below. A minimum 3.0 GPA (during their junior year) and a GMAT score of at least 600 are required to apply. Upon completion of their senior year, students receive their BS degree. In the fifth year they are officially admitted to the MBA program. Additional information can be found on the School of Management website. Advising for the MBA program and courses is provided by SoM, not the ECE department.

**Electrical Engineering: Senior Year (Fast Track MBA)**

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 487. <strong>Senior Project I (O)</strong></td>
<td>3</td>
</tr>
<tr>
<td>MGMT 505. Finance (Professional Elective II)</td>
<td>4</td>
</tr>
<tr>
<td>MGMT 501. Accounting (Professional Elective I)</td>
<td>4</td>
</tr>
<tr>
<td>Technical Elective I</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 488. Senior Project II</td>
<td>3</td>
</tr>
<tr>
<td>MGMT. 507. Operations Management**</td>
<td>4</td>
</tr>
<tr>
<td>Technical Elective II</td>
<td>3</td>
</tr>
<tr>
<td>General Education (A) Requirement</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

**Computer Engineering: Senior Year (Fast Track MBA)**

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 487. <strong>Senior Project I (O)</strong></td>
<td>3</td>
</tr>
<tr>
<td>CS 311. Operating Systems Concepts</td>
<td>4</td>
</tr>
<tr>
<td>MGMT 501. Accounting (Professional Elective I)</td>
<td>4</td>
</tr>
<tr>
<td>MGMT 505. Finance (Technical Elective I)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE 488. Senior Project II*</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 507. Operations Management**</td>
<td>4</td>
</tr>
<tr>
<td>Technical Elective II</td>
<td>3</td>
</tr>
<tr>
<td>General Education (A) Requirement</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

* EECE 487 and 488 will continue to be 4 cr. each until Fall 2015

** MGMT 507 can be taken during the Winter Session instead. However, a better option would be to complete the spring semester General Education course earlier in the program or over a summer.
EECE 251: Digital Logic Design  
[4 credits; fall]  
Fundamental and advanced concepts of digital logic. Boolean algebra and functions. Design and implementation of combinatorial and sequential logic, minimization techniques, number representation, and basic binary arithmetic. Logic families and digital integrated circuits and use of CAD tools for logic design. Laboratory exercises. This course is assessed a $215 fee upon registration. Fees are refundable only within the first week of classes for students who withdraw and non-refundable thereafter.  
Corequisite: PHY 132

EECE 260: Electric Circuits  
[4 credits; spring]  
Units and definitions. Ohm’s Law and Kirchhoff’s Laws. Analysis of resistive circuits. Circuit analysis using: Nodal and mesh methods, Norton and Thevenin theorems, and voltage divider. Transient and sinusoidal steady-state response of circuits containing resistors, capacitors, and inductors. Laboratory exercises. This course is assessed a $25 fee upon registration. Fees are refundable only within the first week of classes for students who withdraw and non-refundable thereafter.  
Prerequisites: PHYS 132

EECE 281: Electrical and Computer Engineering Seminar I  
[1 credit; fall]  
Overview of the fields of electrical engineering and computer engineering. Various sub-fields within EE and CoE are explored, with emphasis on how they are interrelated. Issues relevant to careers in EE and CoE (e.g., typical tasks done by EEs and CoEs) are explored.  
Prerequisites: Sophomore standing in EE or CoE program

EECE 287: Sophomore Design  
[4 credits; spring] replaces EECE 252  
Design-based introduction to embedded computer systems. Organization and composition of computer processors, memory, and peripherals. Introduction to assembly-language and embedded C programming. Design of hardware and software for embedded processor applications. Laboratory exercises and design projects. This course is assessed a $45 fee upon registration. Fees are refundable only within the first week of classes for students who withdraw and non-refundable thereafter.  
Prerequisites: CS 211 and EECE 251

EECE 301: Signals & Systems  
[4 credits; fall]  
Provides an introduction to continuous-time and discrete-time signals and linear systems. Topics covered include time-domain descriptions (differential and difference equations, convolution) and frequency-domain descriptions (Fourier series and transforms, transfer function, frequency response, Z transforms, and Laplace transforms.  
Prerequisites: EECE 260 and MATH 371
EECE 315: Electronics I  
[4 credits; fall]  
Introduction to electronics, concentrating on the fundamental devices (diode, transistor, operational amplifier, logic gate) and their basic applications; modeling techniques; elementary circuit design based on devices. Laboratory exercises. This course is assessed a $35 fee upon registration. Fees are refundable only within the first week of classes for students who withdraw and non-refundable thereafter.  
**Prerequisites:** EECE 260 and EECE 251

EECE 382: Electrical and Computer Engineering Seminar II  
[1 credit; fall]  
Provides an overview of the professional aspects of the fields of Electrical Engineering and Computer Engineering. Topics to be covered include: typical career paths in EECE, engineering ethics, resume writing and job search techniques, preparing for graduate school, professional engineer license, etc.  
**Prerequisites:** Junior Standing in EE or CoE program

EECE 387: EECE Design Lab  
[4 credits; spring]  
Students will complete a series of assigned design projects that rely on background in the areas of microprocessors, electronics, and signals and systems. Lecture will focus on various aspects of the design process, as well as discussion of component characteristics. This course is assessed a $25 fee upon registration. Fees are refundable only within the first week of classes for students who withdraw and non-refundable thereafter.  
**Prerequisites:** EECE 287, EECE 301, and EECE 315

EECE 487: Senior Project I  
[3 credits; fall]  
Design projects in cooperation with local industry, other external clients, and university sponsored projects – outlining specifications, proposals, time schedules, and paper designs. Periodic design reviews with client, written and oral progress reports, and final presentation. Evaluation based on individual and team performance.  
**Prerequisites:** EECE 387 and Senior Standing

EECE 488: Senior Project II  
[3 credits; spring]  
Continuation of EECE 487. Prototype fabrication and test. Demonstration and documentation of functioning system delivered to client. Evaluation based on individual and team performance.  
**Prerequisites:** EECE 487 or consent of Instructor.

---

**EE REQUIRED Courses / CoE Electives**

EECE 323: Electromagnetics  
[4 credits; spring]  
Fundamentals of electromagnetic fields, Maxwell’s Equations, plane waves, reflections. Application to transmission lines, antennas, propagation, electromagnetic interference, electronics packaging, wireless communication.  
**Prerequisites:** EECE 301 and MATH 323
**EECE 332: Semiconductor Devices**  
[3 credits; fall]  
Basic theory of semiconductors, p-n junctions, bipolar junction transistors, junction and MOS field effect devices; device design and modeling; and fabrication.  
**Corequisite:** EECE 315  
**Prerequisites:** PHYS 132  

**EECE 361: Control Systems**  
[3 credits; spring]  
**Prerequisites:** EECE 301  

**EECE 377: Communications Systems**  
[3 credits; spring]  
**Prerequisites:** EECE 301 and ISE 261  

---  

**CoE REQUIRED Courses / EE Electives**  

**EECE 351: Digital Systems Design**  
[4 credits; fall]  
Synchronous sequential circuit design. Algorithmic state machine method; state reduction; control-data path circuit partitioning. Design of sequential arithmetic circuits. Memory interfacing; bus-based design. Specification and synthesis of digital systems using hardware description language and implementation using programmable logic devices. Simulation, analysis, testing, and verification of digital systems. Laboratory exercises. This course is assessed a $60 fee upon registration. Fees are refundable only within the first week of classes for students who withdraw and non-refundable thereafter.  
**Prerequisites:** EECE 287  

**EECE 352: Computer Architecture**  
[3 credits; spring]  
**Prerequisites:** EECE 351  

**EECE 359: Computer Networks**  
[4 credits; spring]  
Theoretical basis for and practical foundations of modern data communications within and between computing systems. Topics include: properties of signals and transmission media; data encoding and modulation, multiplexing, and multiple access; data security and integrity, error control coding and forward error correction, compression, data encryption; protocol concepts and design, flow control, sliding window protocols, data link control; local area networking, LAN standards, and interconnecting LANs; networking and inter-networking devices, bridges, repeaters, routers; inter-networking protocols. Lab exercises.  
**Prerequisites:** EECE 301 and EECE 351
EE and CoE Electives

**EECE 402: Digital Signal Processing I**  
[3 credits; fall]  
Covers the general area of discrete-time signals and the analysis and design of discrete time systems. Topics include time domain analysis, solutions of difference equations, Z-transform analysis, sampling of continuous-time signals, discrete Fourier transforms, Fast Fourier Transforms, and spectral analysis. Processing of discrete-time signals using the DFT and FFT. Design and implementation of discrete-time filters. Extensive use of software simulations in a high-level language such as Matlab. Technical elective.  
**Prerequisite: EECE 301**

**EECE 405: Cryptography and Information Security**  
[3 credits; fall]  
**Prerequisites: ISE 261 or MATH 327 and CS 211**

**EECE 416: Analog Circuit Design**  
[3 credits; fall]  
Introduction to analog circuit design including integrated circuits. Course topics include large and small-signal analysis, sub-threshold and above-threshold designs, basic integrated circuit processing and layout, circuit characteristics (gain, input/output resistance, etc.), amplifier structures, frequency/time response, feedback and stability, noise, and temperature effects. This course includes several projects requiring the use of industrial CAD tools for integrated circuit design, layout, and simulation. Technical Elective.  
**Prerequisite: EECE 315**

**EECE 418: Electric Power Systems**  
*Anticipated name change to: Power Systems I: Equipment and Power Flow*  
[3 credits; fall]  
This course will cover the basics of electric power systems including developments related to the more widespread use of intermittent renewal energy sources. Topics in the course will include a review of fundamental circuit principles related to power system networks, principles of magnetic theory related to power systems, transformers, synchronous generators, AC and DC transmission lines, power flow, stability and control in interconnected power systems, power fault analysis, and other general characteristics of electric power systems. Technical Elective.  
**Prerequisites: Course in Electric Circuits and a course in Electromagnetics**

**EECE 419: Power Electronics**  
[3 credits; fall]  
Electronic processing of electrical energy. Overview of power electronics devices such as DMOSFET, IGBT and Thyristors. Power supply circuits from AC or DC sources as used in computers, inverters and variable-speed motor drives. Analytical and numerical techniques for simulation. Technical elective.  
**Prerequisites: EECE 315 and EECE 361**

41
EECE 421: Electric Drives
[3 credits; spring]
Fundamentals of electric drive systems with applications emphasis. The course offers an integrative treatment of multiple components that make up electric drives, including electrical machines, power-electronics-based converters, mechanical systems, feedback controller design, and the interaction of the drives with the utility grid. Technical elective.
Prerequisites: EECE 260, EECE 301 and EECE 323

EECE 422: Principles of Electro-Mechanical Systems
[3 credits; spring]
With the surge in use of electro-mechanical systems ranging from robotic systems to small passenger vehicles to multi-megawatt windmills, and many other systems, there is an increasing need for a combination of electrical engineering and mechanical engineering expertise applied to electro-mechanical systems. Fundamental technical areas from electrical engineering include basic circuit theory, power electronics, DC motors and generators, control theory, and batteries. Fundamental technical principles from mechanical engineering include torque, vibration, heat dissipation, stress and strain, and strength of materials. Controls, reliability, efficiency and coupling between electrical drives and internal combustion engines are important topics spanning both mechanical and electrical engineering. These technical areas will be covered from a systems perspective. The course is intended for electrical or computer engineering majors with a limited background in mechanical engineering and mechanical engineering majors with a limited background in electrical engineering. Technical Elective.
Prerequisites: Senior standing in EE or ME and a course in Circuit Theory

EECE 423: Power Systems II: Protection and Control
(offered as 480G spring 2015; 423 every spring thereafter)
[3 credits; spring]
The purpose of this course is to continue developing basic skills for analyzing electric power systems. The course gives an overview of a power system and is focused on problems and analysis methods that are essential in power system planning, operation, and control. Specifically, the course addresses the following topics: an overview of power system and structure of electric power industry; basics of fault analysis and protection systems; generator transients; basics of stability concepts and stability analysis; basics of load frequency control, automatic generation control, and voltage control. Technical Elective.
Prerequisites: EECE 418, or approval of instructor

EECE 431: Introduction to Microfabrication
[4 credits; spring]
Multidisciplinary Introduction to Microfabrication: Introduction to clean room tools, procedures, and theory through the fabrication and characterization of various devices from the fields of electrical engineering, mechanical engineering, physics and chemistry. Fabrication of the devices will cover most clean room tools and techniques, including lithography based patterning methodologies; chemical vapor deposition; sputtering; thermal and e-beam evaporation; thermal oxidation; reactive ion etching; ion implantation; and wet chemical processing. The accompanying lecture will cover the theory of the tools used. Technical Elective.
Prerequisite: permission of the instructor
EECE 432: Physics & Tech of Solar Cells
[3 credits; spring]
This course focuses on the science, engineering fundamentals of the photovoltaic solar energy devices and systems. The lectures would cover solar radiation, semiconductor properties, p-n junction theory, solar cell operating principles and device designs and fabrication of traditional crystalline silicon and thin film solar cells. Students will learn the advanced concepts for high efficiency solar cells and emerging photovoltaic devices like organic (plastic) solar cells and quantum solar cells. The course would cover solar module interconnections, engineering design of solar electricity systems and storage and power conditioning at systems level. Technical Elective.

Prerequisites: EECE 332 or equivalent is desirable but not essential

EECE 438: System on a Chip Design
[3 credits; spring]
Overview of the components of system-on-a-chip (SOC) design from initial technology and architectural choices, to SOC implementation issues (e.g., performance, core selection, on-chip communication networks, power management, package constraints and cost). Also covered are SOC design and implementation processes (e.g., functional integration, simulation, clocking strategies, timing, design for test, and debug strategies). Technical Elective.

Prerequisites: EECE 287 and EECE 315

EECE 451: Digital Systems Design II
[3 credits; spring]
In this course, we focus on the design and synthesis technologies using Verilog Hardware Description Language (HDL) at the Register-Transfer level (RTL). Verilog programming and simulation basics will be discussed, followed by advanced Verilog programming for synthesis. Principles of RTL synthesis will be introduced. The Design Compiler synthesis tool from Synopsys will be discussed in detail. In the final project, 3~4 person teams will be formed and work on the design and synthesis of a large-scale digital circuit using Design Compiler. The pre-synthesis and post-synthesis results will be verified by the ModelSim software. Technical Elective.

Prerequisite: EECE 351

EECE 455: CMOS VLSI Circuits & Architectures
[3 credits; fall]
The topics include the principles of MOSFET transistors, characteristics of CMOS digital circuits, layout design and process, performance analysis of CMOS gates, circuit design styles using MOSFET, performance, area, and power optimization of CMOS circuits. Commercial design and simulation tools will be used in the class. Laboratory assignments include design, layout, extraction and simulation. Technical Elective.

Prerequisite: EECE 351

EECE 457: Security Engineering
[3 credits; spring]
Introduction to security engineering, systemic analysis and common design principles. Cryptography, multilevel security, system evaluation, real-world vulnerabilities and attacks. Technical Elective.

Prerequisites: EECE 287 or CS 220; familiarity with C or C++ or similar programming language
EECE 462: Control Systems II  
[3 credits; fall]  
Prerequisite: EECE 361

EECE 474: Electro-Optics  
[3 credits; every other fall]  
Prerequisite: EECE 323

EECE 477: Digital Communications  
[3 credits; fall]  
Prerequisite: EECE 377

EECE 480: Special Topics in ECE  
(alpha series, i.e., 480A, 480B, etc.)  
[3 credits; fall/spring]  
Topics in electrical/computer engineering that vary from year to year. If applicable, may be run every fall or spring semester. Technical Elective.

EECE 491: Teaching Practicum  
[variable credit; every semester]  
Assist with undergraduate instruction of a formal course under the direct supervision of the course instructor. May count for one professional elective but may not be used to satisfy a technical elective unless significant work is done and always at the discretion of the Chair or Undergraduate Program Director. Taken with normal (letter) grade option ONLY; NOT P/F or S/U.  
Prerequisite: permission of course instructor

EECE 496: Industrial Internship  
[var. cr.; every semester]  
Engineering work experience in industry. Daily log book, memo progress reports and formal final report required. May satisfy, at most, one professional elective. Internships require course registration during the same term or semester as the internship is being completed (e.g., internships completed during the summer months would require summer registration). Taken with normal (letter) grade option ONLY; NOT P/F or S/U.  
Prerequisite: permission of faculty sponsor for internship

EECE 497: Independent Study  
[var. cr.; every semester]  
Individual study under direct supervision of a faculty member. Approval of proposed subject by the faculty member and plan of study must be obtained prior to registration. Can be used to satisfy either a technical or professional elective. If used to satisfy a technical or professional elective, it must be taken taken with normal (letter) grade option ONLY; NOT P/F or S/U.
EECE 499: Undergraduate Research
[var. cr.; every semester]
Assist with faculty research. Approval of proposed subject by the faculty member and plan of
research must be obtained prior to registration. Can be used to satisfy either a technical or
professional elective. If used to satisfy a technical or professional elective, it must be taken
with normal (letter) grade option ONLY; NOT P/F or S/U.

VII. WATSON SCHOOL STUDENT ORGANIZATIONS

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.

Societies of particular interest to many EE and CoE students are:

- Engineers Without Borders
- Eta Kappa Nu (electrical engineering honor society)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Society of Black Engineers (NSBE)
- Society of Asian Scientists and Engineers (SASE)
- Society of Automotive Engineers (SAE)
- Society of Hispanic Professional Engineers (SHPE)
- Society of Women Engineers (SWE) Tau Beta Pi (engineering honor society)
- Theta Tau (national engineering fraternity)
- Upsilon Pi Epsilon (honor society for the computing sciences)

VIII. CONTACT INFORMATION

Thomas J. Watson School of Engineering and Applied Science,
Dean’s Office and Watson Advising

Dr. Hari Srihari
Dean
ES-1407 777-2871 srihari@binghamton.edu

Ms. Susan Boyce
Secretary to the Dean
ES-1406 777-2871 sboyce@binghamton.edu

Ms. Liz Kradjian
Assistant to the Dean
ES-1409 777-4583 kradjian@binghamton.edu

Ms. Janet Keesler
Assistant Dean
ES-1405 777-6396 jkeesler@binghamton.edu

Dr. Weiyi Meng
Interim Associate Dean for Research
ES-1403 777-6204 meng@binghamton.edu

Dr. Peter Partell
Associate Dean for Academic Affairs and Administration
ES-1404 777-6204 partell@binghamton.edu
Ms. Ellen Tilden  
EB-M10  777-2873  etilden@binghamton.edu  
Coordinator of Graduate Programs

Ms. Denise Lorenzetti  
EB-C Pod  777-3018  denisel@binghamton.edu  
Director of Watson Career and Alumni Connections

Binghamton University General Contacts:

Admissions, Undergraduate  777-2171  
Office of Financial Aid & Student Records  777-6088  
Watson School Advising Office, EB-M00  777-6203  
Ms. Sharon Santobuono, Director  santobu@binghamton.edu  
Mr. Brad Gordon, Academic Advisor  bgordon@binghamton.edu  
Ms. Catherine Miller, Academic Advisor Assistant  cmmiller@binghamton.edu

Electrical and Computer Engineering Department, Faculty/Staff

Mr. Carl Betcher  
ES-2334  777-2038  cbetcher@binghamton.edu  
Lecturer

Dr. Aaron Carpenter  
ES-2307  777-3396  carpente@binghamton.edu  
Assistant Professor

Dr. Yu Chen  
ES-2309  777-6133  vchen@binghamton.edu  
Associate Professor & Graduate Director of Student Affairs

Dr. Seokheun Choi  
ES-2323  777-5913  sechoi@binghamton.edu  
Assistant Professor

Dr. James Constable  
ES-2310  777-7238  constab@binghamton.edu  
Professor Emeritus

Dr. Scott Craver  
ES-2310  777-7238  scraver@binghamton.edu  
Associate Professor & Undergraduate Director

Dr. Tara Dhakal  
ES-2328  777-3680  tdhakal@binghamton.edu  
Assistant Professor

Dr. Mark Fowler  
ES-2315  777-6973  mfowler@binghamton.edu  
Professor

Dr. Jessica Fridrich  
ES-2326  777-6177  fridrich@binghamton.edu  
Professor

Dr. Linke Guo  
ES-2318  777-6593  lguo@binghamton.edu  
Assistant Professor

Dr. Zhanpeng Jin  
ES-2306  777-3363  zjin@binghamton.edu  
Assistant Professor
<table>
<thead>
<tr>
<th>Name</th>
<th>Office</th>
<th>Extension</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Matthias Kirchner</td>
<td>ES-2329</td>
<td>777-3681</td>
<td><a href="mailto:kirchner@binghamton.edu">kirchner@binghamton.edu</a></td>
</tr>
<tr>
<td>Assistant Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. David Klotzkin</td>
<td>ES-2319</td>
<td>777-4813</td>
<td><a href="mailto:klotzkin@binghamton.edu">klotzkin@binghamton.edu</a></td>
</tr>
<tr>
<td>Associate Professor &amp; Graduate Director of Administration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Xiaohua (Edward) Li</td>
<td>ES-2321</td>
<td>777-6048</td>
<td><a href="mailto:xli@binghamton.edu">xli@binghamton.edu</a></td>
</tr>
<tr>
<td>Associate Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr. Jack Maynard</td>
<td>ES-2334</td>
<td>777-2038</td>
<td><a href="mailto:jmaynard@binghamton.edu">jmaynard@binghamton.edu</a></td>
</tr>
<tr>
<td>Lecturer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ms. Kim Murphy</td>
<td>ES-2311</td>
<td>777-4840</td>
<td><a href="mailto:kmurphy@binghamton.edu">kmurphy@binghamton.edu</a></td>
</tr>
<tr>
<td>Assistant to the Chair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Vladimir Nikulin</td>
<td>ES-2320</td>
<td>777-6956</td>
<td><a href="mailto:vnikulin@binghamton.edu">vnikulin@binghamton.edu</a></td>
</tr>
<tr>
<td>Associate Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Alok Rastogi</td>
<td>ES-2322</td>
<td>777-4854</td>
<td><a href="mailto:arastogi@binghamton.edu">arastogi@binghamton.edu</a></td>
</tr>
<tr>
<td>Associate Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Victor Skormin</td>
<td>ES-2316</td>
<td>777-4013</td>
<td><a href="mailto:vskormin@binghamton.edu">vskormin@binghamton.edu</a></td>
</tr>
<tr>
<td>Distinguished Service Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Douglas Summerville</td>
<td>ES-2305</td>
<td>777-2942</td>
<td><a href="mailto:dsummer@binghamton.edu">dsummer@binghamton.edu</a></td>
</tr>
<tr>
<td>Associate Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr. Kyle Temkin</td>
<td>ES-2308</td>
<td>777-4343</td>
<td><a href="mailto:ktemkin@binghamton.edu">ktemkin@binghamton.edu</a></td>
</tr>
<tr>
<td>Instructor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ms. Shelia VanKuren</td>
<td>ES-2313</td>
<td>777-5323</td>
<td><a href="mailto:svankure@binghamton.edu">svankure@binghamton.edu</a></td>
</tr>
<tr>
<td>Undergraduate &amp; Graduate Secretary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Roger Westgate</td>
<td></td>
<td></td>
<td><a href="mailto:westgate@binghamton.edu">westgate@binghamton.edu</a></td>
</tr>
<tr>
<td>Professor Emeritus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. N. Eva Wu</td>
<td>ES-2325</td>
<td>777-4375</td>
<td><a href="mailto:evawu@binghamton.edu">evawu@binghamton.edu</a></td>
</tr>
<tr>
<td>Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Stephen Zahorian</td>
<td>ES-2312</td>
<td>777-4846</td>
<td><a href="mailto:zahorian@binghamton.edu">zahorian@binghamton.edu</a></td>
</tr>
<tr>
<td>Professor &amp; Department Chair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Ziang (John) Zhang</td>
<td>ES-2317</td>
<td>777-2481</td>
<td><a href="mailto:ziang.zhang@binghamton.edu">ziang.zhang@binghamton.edu</a></td>
</tr>
<tr>
<td>Assistant Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dr. Ning Zhou</td>
<td>ES-2327</td>
<td>777-3195</td>
<td><a href="mailto:ningzhou@binghamton.edu">ningzhou@binghamton.edu</a></td>
</tr>
<tr>
<td>Assistant Professor</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IX. FREQUENTLY ASKED QUESTIONS

Grades

Q. If I fail a class but then pass it, are both grades averaged into my GPA?
   
   A. Yes.

Q. Can you pass/fail a Gen Ed course?

   A. Only Physical Education.

Note: Under the general terms of pass/fail, these rules apply: A “P” does not affect a grade point average. An “F” does factor into the grade point average, regardless of whether the class is taken for a letter grade or under the pass/fail option. However: HWS courses receiving an “F” DO NOT AFFECT GPA and HWS courses are NEVER taken for a letter grade.

Q. Does a "D" grade for a Gen Ed course fulfill the requirement?

   A. Yes.

Q. How does a student appeal a grade?

   A. An appeal of a grade is a situation that the student and professor resolve together.

Q. If I passed a course, but I want to try for a better grade, can I retake it and will the better grade count?

   A. No. You can retake the course to learn the material better, but only the original grade will count. See page 23 for more details.

General Education

Q. How many Gen Ed courses are there?

   A. There are 10 different requirements: Composition(C), Oral Communication(O), Pluralism(P)*, Globalism(G), Laboratory Science(L), Social Science (N), Math
(M), Aesthetic (A), Humanities (H), Physical Education (S/B), and Foreign Language**.

*Students who received an 85 on the NYS Regents Examination for History may take any (P) course. Those that did not receive at least an 85 on the Regents will be required to choose from a list of (P) courses. See an adviser for further details.

** Waived for all Watson Students. All CS majors are required to take one semester of foreign language IF a score of 85 is not met on the NYS Regent Examination.

Q. Does WTSN 111/112 fulfill a Gen Ed requirement?
A. Yes, a "J" with the successful completion of the WTSN sequence 103 and 111; WTSN 104 and 112.

Q. If a course has more than one Gen Ed letter, do I get all of them?
A. No, only one Gen Ed course can fill one Gen Ed requirement. The exception to this is the Composition "C", or "J" which will double count.

Q. Is a foreign language course required for engineering students?
A. Not for Engineering students. CS students are required 1 semester of a college level foreign language, if an 85 in the NYS regents is not met.

Q. What does it mean when a course has a "W" indicator on it?
A. This relates only to Harpur College writing requirements and is not equal to the General Education "C" indicator required by Watson.

Q. If I did not attend a New York state school, how do I fulfill the Pluralism course?
A. If you attended a non-regents high school and earned a grade of 85 or better or a B in US History, you may take any "P" course.
Transfer Credits

Q. How will I know if a class I take over the summer will transfer back to Binghamton and how will it affect my GPA and overall credits?

   A. Pick up a "Petition to Take Courses at Another Institution" form from Watson Advising, read the instructions and fill it out. This will tell you if it will transfer and for which requirement. Your GPA will not be affected, but your credits will be updated upon successful receipt of your transcript from that school.

Q. How do I find out if my transcript from another school has been applied to my record?

   A. Check your Degree Works (or DARS) Report.

Q. Can Physics be transferred from another school for an engineering major?

   A. File a "Petition to Take Courses at Another Institution" form. If it is approved, it will count. For an engineering major, you must make sure that the physics class you are taking is CALCULUS based, otherwise it will not count.

Q. How do I do an intra-university transfer and what is the necessary GPA?

   A. Intra-University transfer request forms are available in undergraduate admission (Academic A). They also provide information sheets on special admission requirements set by each school. (GPA/courses). For engineering, it is advised that you speak to an advisor in Watson Advising prior to filling out IUT paperwork.

Majors / Minors

Q. Is it possible to complete a minor with an engineering major?

   A. Once you have accrued 60 credits on the system (including transfer and AP credits), go to the department you would like to minor in and pick up the application. Meet with an advisor to help fit it in your schedule. Note: CoE CANNOT minor in CS.
Q. Is it possible to double major in electrical engineering and computer engineering?

A. Yes. See page 34 for more details.

Q. When do engineering students confirm their majors and how difficult is it to switch to another Watson major?

A. Engineering students confirm their major late in their second semester (spring) as a freshman. This is completed online.

Courses

Q. What is a typical semester for a first year student?

A. A typical semester runs anywhere from 12 credits to 16 credits (not including PE classes). A typical course can range from 3-4 credits. Engineering majors are encouraged to follow the 4-year course guidelines to stay on track to graduate in 4 years.

Q. If I haven't taken Watson 111, is there a course that is a suitable substitution and is it possible to transfer this course in from another institution?

A. A situation like this is dealt with on an individual basis in consultation with Watson Advising or your chosen department undergraduate director.

Q. How important is it to follow the recommended schedule? What happens if you fall behind?

A. Engineering is rigid because many courses are offered only in the Fall or Spring, with many being sequential. Some preapproved math, science, and humanities courses can be taken during the summer.

Q. How do I change sections of the same course?

A. If this is done after the add deadline, you must fill out a section change form so the registrar can make the adjustment.
Q. If a course requires permission from a professor how do I do that?

A. Speak with the professor, occasionally there are notes attached to a course in the schedule of classes. It is important to read those.

Q. What if I keep getting shut out of PE courses?

A. If you can, attend the course and speak to the instructor. You can petition the course by filling out a form in the Physical Education department.

Q. How does a student petition a class?

A. Go to the department you wish to petition and pick up the form, bring it to class and have the instructor sign.

Q. What is the overload procedure?

A. Use the General Academic Petition form from Watson Advising, listing the courses you are registered for, the course you would like to register for, your GPA, the reason, and total number of credits you need. Obtain the appropriate signatures and turn it into Watson Advising for processing. You must have a 3.0 GPA or be a graduating senior to qualify for an overload.

Q. Where do I go for tutoring?

A. You can review tutoring services through the BU BRAIN website under Academic Support and/or Tutoring Services.

Q. Is a 300 level course too advanced for freshmen? How does the course numbering work?

A. Generally speaking 100-200 level are suitable for freshman/sophomore, 300-400 are suitable for juniors/seniors. For further details, please look at the course description.
Q. What do I do if I miss several classes due to a family emergency?

A. This is worked out on an individual basis with your instructors but the Watson School Advising Office can help. Call (607) 777-6203 for assistance.

Q. What do I do if a course is still on my record after I thought I dropped it?

A. If it is before the drop deadline, log onto BU Brain and drop it. If it is past the drop deadline, contact Watson Advising.

---

Volunteers / Internships / Study Abroad

Q. Where would I find a list of volunteer opportunities?

A. The Off Campus College office located in the New Union can help you find some opportunities.

---

Q. Is it possible to study abroad?

A. Yes. International Student and Scholar Services. Their office is located in LS G500 (Library South Ground, room 500) or call them at 777-2510

- Also make an appointment with your advisor. It is a good idea to meet with your Watson Adviser for course selection. –

---

Q. How do summer internships work? Can I receive credit for one?

A. There are many ways to find out what internship opportunities are out there. You may receive some through your Binghamton email address; you can visit Watson Career and Alumni Connections office, EB-Cpod or visit their website http://www.binghamton.edu/watson/student-service. Lastly, you can visit the Career Development Center or view opportunities through hireBING. Engineering majors can get an internship noted on their transcript which can be worth zero to 3 credits. If you are looking for a credit-based internship, see your individual department for processing. See page 32 for more details.
Q. How do I make an appointment to see an advisor?

A. Go to their office during office hours, which you will find posted on the ECE website. Most are also available by appointment, through email. If your faculty advisor is unable to answer your question, Watson Advising takes appointments. The peer advisors can also answer many of your questions.

Probation

Q. How many credits can a student on probation take?

A. Fourteen (14) credits.

Graduating

Q. If I have one more course to take to complete my degree requirements, and I take it during a summer semester, what commencement ceremony can I attend?

A. If completing your last course during a summer (i.e. 2014) semester, you can participate in either the upcoming fall (i.e. 2014) or spring (i.e. 2015) ceremonies or you can petition to walk in the previous spring (i.e. 2014) ceremony. Currently, students are allowed to participate in a ceremony within 1 year of having their degree awarded.

X. LIST OF LINKS PERTINENT TO STUDENTS

Below is a list of links that appear in this handbook and some others that are pertinent or of interest to students.

- ECE Department
  
  http://www.binghamton.edu/ece/

- University Academic Honesty Code
  
  http://www.binghamton.edu/ece/grad/academic-honesty.html

- Watson School Academic Honesty Code
  
  http://www.binghamton.edu/watson/about/honesty-policy.pdf

- ABET
  
  http://www.abet.org

- Undergraduate Admission
http://www.binghamton.edu/admissions/

- Financial Aid

http://www.binghamton.edu/financial-aid

http://www.fafsa.ed.gov/

- SUNY Seamless Transfer

http://www.suny.edu/attend/get-started/transfer-students/suny-transfer-paths/suny-transfer-paths-all-2015/

- Minor in Sustainability Engineering

http://www.binghamton.edu/engineering-design/academic-programs/sustainability-minor.html

- Study Abroad


- GenEd FAQ’s

http://www.binghamton.edu/general-education/faq-students.html#exam

- Commencement

http://www.binghamton.edu/commencement/

- Online and printable forms commonly used by Watson Students including:
  - BU Withdrawal Form
  - Petition to Take Courses at Another Institution
  - Engineering Summer Internship Form for Zero Credit
  - General Academic Petition
  - Grade Option Change
  - Online Late Course Add Petition
  - Online Late Course Withdrawal Petition
  - Section Change Form
  - Release of Student Information

http://www.binghamton.edu/watson/student-services/advising/forms.html

- BU BRAIN – everything student related:

https://my.binghamton.edu/group/mycampus/home

55