Wilkes University Curriculum Committee

PROPOSAL SUBMITTAL FORM

Directions:
- Use this set of forms for all proposals sent to the Curriculum Committee.
- Pages 1-3 of this document are required. Any unnecessary forms should be deleted from the packet before submissions. If multiple forms are needed (course addition, course deletion, etc), simply copy and paste additional forms into this packet.
- Note that all new programs (majors and minors), program eliminations, significant program revisions and all general education core revisions must be reviewed and approved by the Provost and Academic Planning Committee (APC) prior to submission to the Curriculum Committee. The Provost will make the decision if a program revision requires APC review.
- Completed and signed forms are due no later than the second Tuesday of every month. Submit one signed original hard copy and a scanned electronic copy with all signatures to the Chair of the Curriculum Committee.

1. Originator: Dr. Gregory Harms, Dr. Del Lucent - Department of Electrical Engineering and Physics; Dr. Henry Castejon, Dr. Edward Bednarz - Department of Mechanical Engineering

2. Proposal Title: New courses numbers EE 140, ME 140 and PHY 140 to replace EGR 140

3. Check only one type of proposal: (double click on the appropriate check box and change default value to “checked”).

☐ New Program. (Major or Minor Degree Programs). This requires prior review and approval by the Provost and APC.
☐ Elimination of Program. (Major or Minor Degree Programs). This requires prior review and approval by the Provost and APC.
☐ Program Revision. Significant revisions to a program require review and approval by the Provost. The Provost determines if review and approval by APC is necessary.
☐ General Education Revision. Submissions only accepted from the General Education Committee (GEC). Must be reviewed and approved by the Provost.
☐ Creation of new departments, elimination of existing department. This requires prior review and approval by the Provost and APC.
☒ Course additions or deletions not affecting programs (such as elective courses, transition of “topics” courses to permanent courses).
☐ Change in course credit or classroom hours.
☒ Incidental Changes. Includes changes in course/program title, course descriptions, and course prerequisites. (Although these changes do require approval by the Curriculum Committee, they do not go before the full faculty for approval).
☐ Other (Specify)
4. Indicate the number of course modification forms that apply to this proposal:

__3__  Course Addition Form  
__1__  Course Deletion Form  
__2__  Course Change Form (PHY 214, EGR 222)

5. Executive Summary of Proposal.

Briefly summarize this proposal. The breadth and depth of this executive summary should reflect the complexity and significance of the proposal. Include an overview of the proposal, background and reasoning behind the proposal and a description of how the proposal relates to the mission and strategic long-range plan of the unit and/or university. For incidental changes a one or two sentence explanation is adequate.

The Departments of Mechanical Engineering and Electrical Engineering and Physics have previously modified the introductory course in Scientific Programming, EGR 140, in order to strengthen fundamental skills in basic science, computer programming, and mathematics for electrical engineering majors as indicated by the reviewers of our most recent ABET visit for the Electrical Engineering Program. As a result of the revisions to this course implemented two years ago, ABET has removed the weakness assessed to the Electrical Engineering Program that was previously designated to this issue.

However, our proposed changes were implemented on the general EGR 140 course, which is meant for all Mechanical Engineering, Engineering Management, Applied Engineering Sciences and Electrical Engineering Majors and might restrict course needs for the specific programs.

This proposal is about the re-branding of the previously approved EGR 140 course into courses that can be directly assigned from the Department of Electrical Engineering and Physics, EE 140 and PHY 140, respectively, for both the Electrical Engineering Majors and for our Physics Majors and of the re-branding of a course similar to EGR 140 but program specific course for the Mechanical Engineering, Engineering Management, Applied Engineering Sciences Majors, ME 140. The EGR 140 course will then be removed.

6. Other specific information. (Not applicable for incidental changes.)
What other programs, if any, will be affected by this proposal? Describe what resources are available for this proposal. Are they adequate? What would be the effect on the curriculum of all potentially affected programs if this proposal were adopted? Include any potential effects to the curriculum of current programs, departments and courses.

The modifications to EGR 140 only changes the title of EE 140 and PHY 140 and will only have modifications to the ME 140 course. This will only affect Electrical Engineering, Mechanical Engineering, Engineering Management and Applied Engineering Science majors and program as although the EE 140, ME 140 and PHY 140 courses will have some of the same outcomes, the content will be applied to programming languages and subjects as needed by the individual majors and programs as well as a few differences in outcomes.

7. Program Outline. (Not applicable for incidental changes).

A semester-by-semester program outline as it would appear in the bulletin for a new program or any modified program with all changes clearly indicated.

Electrical Engineering Major - Required Courses and Recommended Course Sequence

First Semester
- MTH-111 Calculus I (4 credits)
- CHM-117 Introductory Chemistry Lab for Engineers (1 credit)
- CHM-118 Chemistry for Engineers (3 credits)
- ME-180 CADD Lab (1 credit)
- ENG-101 Composition (4 credits)
- FYF-101 First-Year Foundations (3 credits)
  - Total: 16 credits

Second Semester
- MTH-112 Calculus II (4 credits)
- PHY-201 General Physics I (3 credits)
- PHY-204 General Physics I Laboratory (1 credit)
- EE 140 Scientific Programming (3 credits)
  (Replaces EGR-140 Computational & Statistical Analysis (3 credits))
- EGR-200 Introduction to Materials Science (3 credits)
- Distribution Requirement (3 credits)
  - Total: 17 credits

Third Semester
- MTH-211 Intro. to Differential Equations (4 credits)
- PHY-202 General Physics II (3 credits)
- PHY-202 General Physics II Laboratory (1 credit)
- EE-211 Electrical Circuits and Devices (3 credits)
- EE-283 Electrical Measurements Lab (1 credit)
- ME-231 Statics (3 credits)
  - Total: 15 credits

Fourth Semester
- MTH-212 Multi-variable Calculus (4 credits)
• EE-251 Electronics I (3 credits)
• EGR-222 Mechatronics (3 credits)
• EE-241 Digital Design (4 credits)
• Distribution Requirement (3 credits)
  – Total: 17 credits

Fifth Semester
• EE-252 Electronics II (4 credits)
• EE-271 Semiconductor Devices (4 credits)
• EE-381 Microfabrication Lab (3 credits)
• PHY-214 Linear Systems (3 credits)
• Distribution Requirement (3 credits)
  – Total: 17 credits

Sixth Semester
• EGR-399 Cooperative Education** (6 credits)
• or Technical Electives* (6 credits)
• EGR-201 Professionalism and Ethics (1 credit)
• Distribution Requirements (6 credits)
  – 3 credits
• EGM-320 Engineering Project Management & Analysis (3 credits)
• PHY 203 Modern Physics (3 credits)
• PHY 206 Modern Physics Laboratory (1 credit)
  – Total: 17 credits

Seventh Semester
• EE-314 Control Systems (3 credits)
• EE-337 Engineering Electromagnetics I (3 credits)
• EE-391 Senior Projects I (1 credit)
• EE-325 Energy Conversion Devices (3 credits)
• Distribution Requirement (6 credits)
  – Total: 16

Eighth Semester
• EE-339 Engineering Electromagnetics II (4 credits)
• EE-382 Modern Communication Systems (4 credits)
• EE-392 Senior Projects II (2 credits)
• Technical Elective* (3 credits)
• Free Elective (3 credits)
  – Total: 16

*Technical electives may be chosen from any advisor-approved math, science, or engineering course numbered 200 or above to satisfy a concentration requirement.

**Students must consult with the Cooperative Education Coordinator to determine availability and proper scheduling of the Cooperative Education experience.

Physics Bachelor of Arts Degree Required Courses and Recommended Course Sequence (123 Credits)
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td>MTH 111 Calculus I*</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CHM 115 Elements &amp; Compounds*</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHM 113 Elem. &amp; Comp. Lab*</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ENG 101 Composition</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>FYF 101 First-year Foundation</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td><strong>Second Semester</strong></td>
<td>MTH 112 Calculus II*</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHY 201 General Physics I*</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHY 204 General Physics I Lab*</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>PHY 140 Scientific Programming</strong></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(Replacing: EGR 140 Comp. &amp; Stat. Analysis**)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Physics Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Distribution Requirement</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td><strong>Third Semester</strong></td>
<td>MTH 211 Differential Equations*</td>
<td>4</td>
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<tr>
<td></td>
<td>PHY 202 General Physics II*</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHY 202 General Physics II Lab*</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Physics Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Distribution Requirement</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td><strong>Fourth Semester</strong></td>
<td>MTH 212 Multivariable Calculus*</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHY 203 General Physics III*</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHY 206 General Physics III Lab*</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Physics Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Distribution Requirement</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>17</td>
</tr>
<tr>
<td><strong>Fifth Semester</strong></td>
<td>PHY 311 Thermodynamics*</td>
<td>3</td>
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<td></td>
<td>PHY 312 Analytical Mechanics*</td>
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<td></td>
<td>EE 337 Electricity &amp; Magnetism I*</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Physics Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Distribution Requirement</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td><strong>Sixth Semester</strong></td>
<td>PHY 314 Quantum Mechanics*</td>
<td>3</td>
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<td></td>
<td>Physics Elective</td>
<td>9</td>
</tr>
<tr>
<td>Distribution Requirement</td>
<td>3</td>
<td></td>
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<tr>
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</table>

**Seventh Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>PHY 391 Senior Projects I*</td>
<td>1</td>
</tr>
<tr>
<td>Physics Elective</td>
<td>6</td>
</tr>
<tr>
<td>Free Elective</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
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</table>

**Eighth Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 392 Senior Project II*</td>
<td>2</td>
</tr>
<tr>
<td>Physics Elective</td>
<td>6</td>
</tr>
<tr>
<td>Free Elective</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

*Required Core Course for BA in Physics Major.
**Can be substituted with CS 125

**The Minor Requirements for Secondary Education Certification:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 180 Education Psychology (3)</td>
<td></td>
</tr>
<tr>
<td>ED 190 Efficient Teaching (3)</td>
<td></td>
</tr>
<tr>
<td>ED 191 Integrating Technology in Classroom (3)</td>
<td></td>
</tr>
<tr>
<td>ED 220 Teaching Culturally and Linguistically Diverse Learners (OPO) (3)</td>
<td></td>
</tr>
<tr>
<td>EDSP 210 Teaching Students with Special Needs (3)</td>
<td></td>
</tr>
<tr>
<td>EDSP 225 Special Education Methodology (OPO) (3)</td>
<td></td>
</tr>
<tr>
<td>ED 371 Teaching Methods in Science (3)</td>
<td></td>
</tr>
<tr>
<td>ED 380 Content Area Literacy (3)</td>
<td></td>
</tr>
<tr>
<td>ED 390 Student Teaching or Elective (12)</td>
<td></td>
</tr>
</tbody>
</table>

(For those students seeking the Minor in Secondary Education, the aforementioned courses will count as Physics electives.)

**Physics Electives:**

Physics electives can be selected from any 200 and above technical courses from mathematics, biology, chemistry, computer science, environmental engineering, electrical engineering, or mechanical engineering and are subject to approval from the student’s advisor in the Physics Program and the Faculty of Physics.
8. Signatures and Recommendations. (please date)
   - Signatures of involved Department chair(s) and Dean(s) indicate agreement with the proposal and that adequate resources (library, faculty, technology) are available to support proposal.
   - If a potential signatory disagrees with a proposal he/she should write “I disagree with this proposal” and a signed statement should be attached to this submission.

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gregory Harms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chair, Dept. of EE &amp; Physics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Henry Castejon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chair, Dept. of ME &amp; EGM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>William Hudson</td>
<td></td>
<td></td>
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<tr>
<td>Dean, College of Science and Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Susan A Hritzak</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registrar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne Skleder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provost (For new programs, significant revisions and revisions to the General Education Program revisions only).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provost should check here ____ if this proposal is a program revision AND the significance of the revision requires review and approval by APC prior to Curriculum Committee.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Print Name</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Chair, Academic Planning Committee. For new programs, program revisions sent via the provost. Signature indicates that the proposal has been reviewed and approved by APC.</td>
<td></td>
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</tr>
<tr>
<td>Print Name</td>
<td>Signature</td>
<td>Date</td>
</tr>
<tr>
<td>Chair, General Education Committee. For revisions to General Education program only. (Signature indicates that the proposal has been approved by GEC).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Wilkes University Curriculum Committee
COURSE ADDITION FORM – page 1

1. Course Title: Scientific Programming

2. Course Number: ___EE 140_____________
   Coordinate with Registrar to insure course number is available

3. Course Credit Hours: 3
   Classroom Hours__2___  Lab Hours__2___  Other_______

4. Course Prerequisites: MTH 100 or MTH 111 (as Pre-requisite or Concurrent)

5. Course Description (as proposed for the Bulletin):
   Course descriptions provide an overview of the topics covered. If the course is offered on a scheduled basis, i.e. every other year, or only during a set semester, note this in the description. Course descriptions should be no more than two to three sentences in length.

   Description: This course presents an introduction to computer programming with an emphasis on the techniques needed for data analysis and numerical problem solving for scientific and engineering applications. Basic programming idioms are presented including control structures, data types, methods for handling input and output as well as numerical methods such as array computing and vectorization. Emphasis is placed on proper software engineering practice as well as data analysis and presentation.

   Pre-requisites MTH 100 or MTH 111 (as Pre-requisite or Concurrent)
   Credits: 3 (2 hours of lecture and 2 hours of laboratory per week)

6. Required Documentation:
   Proposed Syllabus  Attach proposed syllabus immediately after this document. In some situations the official syllabus may contain information which is beyond the review needs of the Curriculum Committee (such as extensive rubrics, etc). It is permissible to attach an abbreviated syllabus. In general, syllabi (whether full or abbreviated) should contain the following information: Course Title, Course Number, Credit hours, Faculty Information (name contact information, office hours), Course Description, Course Outcomes or Objectives, Assessment (grading) information, required texts (or other things such as tools, software, etc), pertinent policies and a proposed schedule of topics.
Wilkes University Curriculum Committee
COURSE ADDITION FORM – page 1

7. Course Title: Scientific Programming

8. Course Number: __ME 140________________
   Coordinate with Registrar to insure course number is available

9. Course Credit Hours: 3
   Classroom Hours__2___ Lab Hours__2___ Other______

10. Course Prerequisites: MTH 100 or MTH 111 (as Pre-requisite or Concurrent)

11. Course Description (as proposed for the Bulletin): Course descriptions provide an overview of the topics covered. If the course is offered on a scheduled basis, i.e. every other year, or only during a set semester, note this in the description. Course descriptions should be no more than two to three sentences in length.

   Description: This course presents an introduction to computer programming with an emphasis on the techniques needed for data analysis and numerical problem solving for scientific and engineering applications. Basic programming idioms are presented including control structures, data types, methods for handling input and output as well as numerical methods such as array computing and vectorization. Emphasis is placed on proper software engineering practice as well as data analysis and presentation.

   Pre-requisites MTH 100 or MTH 111 (as Pre-requisite or Concurrent)
   Credits: 3 (2 hours of lecture and 2 hours of laboratory per week)

12. Required Documentation:
Proposed Syllabus Attach proposed syllabus immediately after this document. In some situations the official syllabus may contain information which is beyond the review needs of the Curriculum Committee (such as extensive rubrics, etc). It is permissible to attach an abbreviated syllabus. In general, syllabi (whether full or abbreviated) should contain the following information: Course Title, Course Number, Credit hours, Faculty Information (name contact information, office hours), Course Description, Course Outcomes or Objectives, Assessment (grading) information, required texts (or other things such as tools, software, etc), pertinent policies and a proposed schedule of topics.
13. Course Title: Scientific Programming

14. Course Number: PHY 140
    Coordinate with Registrar to insure course number is available

15. Course Credit Hours: 3
    Classroom Hours: 2
    Lab Hours: 2
    Other: ______

16. Course Prerequisites: MTH 100 or MTH 111 (as Pre-requisite or Concurrent)

17. Course Description (as proposed for the Bulletin):
    Course descriptions provide an overview of the topics covered. If the course is offered on a
distributed basis, i.e. every other year, or only during a set semester, note this in the description.
Course descriptions should be no more than two to three sentences in length.

Description: This course presents an introduction to computer programming with an emphasis on
the techniques needed for data analysis and numerical problem solving for scientific and engineering
applications. Basic programming idioms are presented including control structures, data types,
methods for handling input and output as well as numerical methods such as array computing and
vectorization. Emphasis is placed on proper software engineering practice as well as data analysis
and presentation.

Pre-requisites: MTH 100 or MTH 111 (as Pre-requisite or Concurrent)
    - Credits: 3 (2 hours of lecture and 2 hours of laboratory per week)

18. Required Documentation:
Proposed Syllabus
    Attach proposed syllabus immediately after this document. In some situations the official
syllabus may contain information which is beyond the review needs of the Curriculum Committee
(such as extensive rubrics, etc.). It is permissible to attach an abbreviated syllabus. In general, syllabi
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Wilkes University Curriculum Committee  
COURSE CHANGE FORM

**Directions:** Use this form to change information relating to an existing course. Please note, changes to course number require separate course addition/deletion forms (not this form!). Only indicate changes that are proposed (existing and proposed), other fields should be left blank.

**Course Number:** _____PHY 214______
**Course Title:** _____Applied Physics______

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Existing</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Credit hours. (Indicate classroom, lab or “other” hours.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Prerequisites</td>
<td>MTH 211, EGR 140 (or CS 125)</td>
<td>MTH 211 &amp; EE 140 or ME 140 (or PHY 140 or CS 125)</td>
</tr>
<tr>
<td>Course Description (as proposed for Bulletin)¹</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Course descriptions provide an overview of the topics covered. If the course is offered on a scheduled basis, i.e. every other year, or only during a set semester, note this in the description. Course descriptions should be no more than two to three sentences in length.
Wilkes University Curriculum Committee
COURSE CHANGE FORM

**Directions**: Use this form to change information relating to an existing course. Please note, changes to course number require separate course addition/deletion forms (not this form!). Only indicate changes that are proposed (existing and proposed), other fields should be left blank.

**Course Number**: EGR 222

**Course Title**: Mechatronics

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Existing</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Credit hours. (Indicate classroom, lab or “other” hours.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Prerequisites</td>
<td>EGR 140 and EE 211</td>
<td>EE 211 and (EE 140 or ME 140 or PHY 140 or CS 125)</td>
</tr>
<tr>
<td>Course Description (as proposed for Bulletin)</td>
<td></td>
<td></td>
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</tbody>
</table>

1 Course descriptions provide an overview of the topics covered. If the course is offered on a scheduled basis, i.e. every other year, or only during a set semester, note this in the description. Course descriptions should be no more than two to three sentences in length.
Wilkes University Curriculum Committee
COURSE DELETION FORM

1. Course Title: Scientific Programming

2. Course Number: EGR 140

3. Course Credit Hours: 3.0

   Classroom Hours__2___    Lab Hours__2___    Other____

4. Effective date of course deletion (semester/year)

   Fall 2018_
EE 140, PHY 140: Scientific Programming
Spring 2017 Syllabus

Location and Meeting Time
SLC 216, Monday, Wednesday 10:00 AM - 11:50 AM

Instructor Information:
- Dr. Del Lucent
- del.lucent@wilkes.edu
- 570.408.4834
- Office: SLC 231
- Office Hours:
  - Monday 12:00 – 2:00
  - Wednesday 12:00 – 1:00
  - Thursday 1:00 – 3:00
  - by appointment

Textbook (required)
- A Primer on Scientific Programming in Python, 4th edition
- By Hans Petter Langtangen

Software
You do not need to purchase any software for this course. All of the software required should be installed on the computers you will use during lecture/lab. The following list though is for those of you who want to ensure that you can have a similar programming environment on your own computers. Please note that all of these tools are either free and open-source, or can be used freely for an indefinite amount of time.

- We will be using the Python programming language (version 3.5) for the first part of this course and the C programming language (C99) for the second. We will use the Anaconda Scientific Python Distribution because it is free and easy to install and also installs a bunch of useful scientific and engineering libraries for Python as well (https://www.continuum.io/downloads). We will use GCC as our C compiler (which requires Windows 10 if you are running windows). GCC comes with XCode on OS X and comes with basically every version of Linux.
- There are two different ways to write computer code: in a simple text editor (not a word processor!) or in an IDE (interactive development environment). There are many choices for both of these, but I would recommend Sublime Text (https://www.sublimetext.com/) for a text editor and Spyder for a Python IDE (comes with Anaconda).
- You will need to learn to use an appropriate command-line environment (or shell) for your operating system. On Linux or OS X this will be the Terminal application (running bash)
and on Windows this will be cmd.exe or PowerShell. If you have Windows 10, you can install bash using the developer tools, allowing you to learn only one set of commands that work in Windows, OS X, and Linux.

**Course Description**

Computer programming with an emphasis on data analysis and numerical problem solving for scientific and engineering applications. Basic programming idioms are presented including control structures, data types, methods for handling input and output as well as numerical methods such as array computing and vectorization.

Two hours of lecture and one two-hour lab per week.

- *Prerequisite:* MTH 100 or *Corequisite:* MTH 111
- *Credits:* 3 (2 hours of lecture and 2 hours of laboratory per week)

**ABET Student Outcomes**

Most of the engineering programs in the College of Science and Engineering are accredited by the Accreditation Board of Engineering and Technology (ABET). This means that we hold all of our students to a consistent level of expectation and ensure that our courses all reinforce specific outcomes that are key to success as a professional engineer. These outcomes (as defined by ABET) are:

a. Ability to apply mathematics, science and engineering principles.
b. Ability to design and conduct experiments, analyze and interpret data.
c. Ability to design a system, component, or process to meet desired needs.
d. Ability to function on multidisciplinary teams.
e. Ability to identify, formulate and solve engineering problems.
f. Understanding of professional and ethical responsibility.
g. Ability to communicate effectively.
h. The broad education necessary to understand the impact of engineering solutions in a global and societal context.
i. Recognition of the need for and an ability to engage in life-long learning.
j. Knowledge of contemporary issues.
k. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

**Course Outcomes**

The specific learning outcomes for this course are listed below. These outcomes have been mapped to the ABET general education criteria where appropriate.

1. Use an interactive programming environment to symbolically and numerically solve mathematical problems (ABET outcome a)
2. To construct Boolean expressions and apply them to program control (ABET outcome e)
3. To list different data types (including floats, integers, strings, arrays, associative arrays, etc.) and explain their uses for the manipulation of different kinds of data. (ABET outcome e)
4. Effectively utilize programming logic and control structures to solve a scientific or engineering problem (ABET outcome e)
a. To us if – then – else and case type structures to allow programs to make decisions
b. To use for loops to iterate over fixed length collections of data
c. To use while loops to repeat operations until given conditions are met
d. To employ functions to promote program modularization and avoid code duplication.

5. Parse tabular data files and apply basic descriptive statistical analysis to summarize data sets
   (ABET outcome b)
6. Create attractive and informative plots of multidimensional datasets (ABET outcome b)
7. Create stand alone programs that can be used through a command-line interface (ABET outcome c and e)
8. Employ best practices in software development including unit testing, documentation, and
   revision control (ABET outcome k)
9. Implement numerical methods for integration and differentiation, optimization, and
   approximation (ABET outcome a)
10. Describe ethical, privacy, and security issues related to the use, development, and distribution
    of computer software (ABET outcome f and h)
11. To translate interpreted code into compiled code in order to achieve better computational
    performance. (ABET outcome c)

**Course Assessment**

<table>
<thead>
<tr>
<th>Coursework Composition</th>
<th>Grading Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments – 25%</td>
<td>4.0 90% and above</td>
</tr>
<tr>
<td>Quizzes – 20%</td>
<td>3.5 85 – 89%</td>
</tr>
<tr>
<td>Project – 15%</td>
<td>3.0 80 – 84%</td>
</tr>
<tr>
<td>Exams (2) – 30%</td>
<td>2.5 75 – 79%</td>
</tr>
<tr>
<td>Attendance – 10%</td>
<td>2.0 70 – 74%</td>
</tr>
<tr>
<td></td>
<td>1.5 65 – 69%</td>
</tr>
<tr>
<td></td>
<td>1.0 60 – 64%</td>
</tr>
<tr>
<td></td>
<td>0.0 59% and below</td>
</tr>
</tbody>
</table>

**Assignments**

You will have weekly programming assignments in this class. You will be given time to work on these assignments during class period but you will nearly always have to complete them out of class. The process of working through these assignments is the way that you will actually learn programming, quantitative analysis, and software development. These assignments are an individual exercise and plagiarism will not be tolerated. You will submit your assignments online via the course D2L website. *Emailed assignments will not be accepted.*

**Quizzes**

You will have a number of in-class pop quizzes during this course. These will occur at the beginning of class and will take no longer than 15 minutes. The goal of these quizzes is to ensure that you are keeping up with the material and will test your basic understanding of what is presented in the course.

**Project**
Later in the semester you will be assigned a project for which you may work cooperatively in teams of up to 3 members. In this project you will solve an engineering problem by writing a complete computer program. This program will demonstrate all that you have learned through the semester and as such will account for 15% of your total grade. Your project will represent a complete piece of software that another individual can use and will exhibit the following characteristics:

- Proper coding style and documentation
- Proper use of functions and/or classes showing a modular, maintainable design
- Unit tests to demonstrate correct function of all portions of the code
- Properly handle errors
- The ability to intelligently parse user input
- The ability to present output in an appropriate fashion

Details will be given later in as to the specific problem you will be solving and how you will be graded.

Exams
There will be two exams in the course: a cumulative midterm and a cumulative final. These exams will test your understanding of core concepts presented in the course. They will consist of a combination of multiple choice questions and short problems. The midterm will be worth 10% of your total grade and the final will be worth 20%.

Attendance
Since this course is both lecture and laboratory, you will learn by doing. As such attendance of all class periods is required. See the course policies section below for more details regarding the attendance.

Tentative Schedule
The following is a tentative course schedule. We may spend more time on any of these topics and/or cover programming topics not on this list. Also, certain key skills will be taught throughout the course and are not relegated to a specific topic. These include concepts such as optimizing, debugging, documenting, and employing revision control.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January 18</td>
<td>Introduction to Python, Sypder,</td>
<td>Chapter 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sublime Text and Jupyter Notebooks</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>January 23, 24</td>
<td>Symbolic and Numerical Computing</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>3</td>
<td>January 30,</td>
<td>Loops and Lists I</td>
<td>Chapter 2</td>
</tr>
<tr>
<td></td>
<td>February 1</td>
<td></td>
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<tr>
<td>4</td>
<td>February 6, 8</td>
<td>Loops and Lists II</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>5</td>
<td>February 13, 15</td>
<td>Functions</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>6</td>
<td>February 20, 22</td>
<td>Branching and Decisions I</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>7</td>
<td>February 27,</td>
<td>Branching and Decisions II / Midterm</td>
<td>Chapter 3</td>
</tr>
<tr>
<td></td>
<td>March 1</td>
<td>Exam</td>
<td></td>
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<tr>
<td>8</td>
<td>March 6, 8</td>
<td>Spring Break</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>9</td>
<td>March 13, 15</td>
<td>Input and Error Handling</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>10</td>
<td>March 20, 22</td>
<td>Reading and writing files</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>11</td>
<td>March 27, 29</td>
<td>Plotting and Displaying Data</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>12</td>
<td>April 3, 5</td>
<td>Simple numerical methods and</td>
<td>Chapter 5</td>
</tr>
</tbody>
</table>
Course Policies

Attendance
The lecture format will involve combined lecture and laboratory exercises. This means that a great deal of hands-on experience will be gained in class and as such your attendance in every class period is required. **Missing more than two consecutive classes or missing 6 or more classes will result in a failing grade for the course.** Even with legitimate excuses, it is impossible to complete the course objectives without regular attendance. **Additionally, arriving late for class will be counted as an absence.**

Computer usage in class
This course is presented in a combined lecture - laboratory format. As such, you will have a computer in front of you at all times. During class you may not use any software or visit any webpage not directly permitted by your instructor. You may bring your own laptop to lecture provided you abide by these rules on your laptop as well. Your instructors and teaching assistants will be walking around during lecture and if you are caught visiting unapproved webpages or using unapproved software, you will be asked to leave the class. If you are ejected from class for any reason, this will count as an absence and thus all of the above attendance policies will be applied. Furthermore if you are ejected from class for any instance of non-compliance with course policies, this will be reported to the student affairs office to be noted in your academic record.

Late assignments and make-ups
Assignments that are late will be docked 25% per day and will not be accepted after 4 days beyond the due date. **Makeup quizzes and exams will not be given under any circumstances so please ensure that you do not miss any quizzes or exams.**

Personal computer support
Your instructor and your teaching assistants will make every attempt to assist you with basic software difficulties you experience during office hours. Despite this fact, you must recognize that computers differ tremendously and it is ultimately your responsibility to find a way to complete your assignments. This means it is your responsibility to ensure that the required software is installed and functioning correctly on your personal computer. If you cannot make the software function correctly on your own computer, you will be able to use the computers in SLC 216 when other classes are not in session.

Course support
The following mechanisms are available to you should you need additional help in the course:
• **Your TAs will offer supplementary instruction in SLC 216 every Thursday during club hours.** I highly recommend you take regular advantage of this resource.

• The University College Academic Support Program provides tutoring services free of charge for Wilkes students. All tutoring will be held in Conyngham Hall, which is the mansion between SLC and Evans. All appointments with the class tutors will be scheduled through TutorTrac (http://tutortrac.wilkes.edu).

• The EE&P department and the ME department provide free tutoring services at the engineering tutoring center, more details will be announced at the beginning of the semester.

• I hold office hours with the aim of providing assistance to students with questions on the course material.

Please note that I hold office hours with the intent of you coming to seek assistance during these hours. Understand that it is very difficult to respond to technical questions via email. Additionally, it is your responsibility to complete your assignments in a timely manner. I may not be able to respond to last minute emails about an assignment just before the deadline.

**Academic Honesty**

You may work together and help each other to understand material but all code must be written independently (unless specifically permitted by your instructor). Copying and pasting code from other sources is strictly prohibited on all assignments. Use of external sources in your work *that have been approved by your instructor* should be accompanied by the appropriate citation. **Your assignments will be checked electronically for signs of plagiarism.**

*Please refer to the information below regarding the Wilkes University Academic Code of Honesty.*

Note that as a professor I may enact any penalty for academic dishonesty from nothing at all, to immediate failure of the course. Beyond this, all instances of academic dishonesty are reported to the Student Affairs office wherein a note will be added to your academic record. Furthermore Student Affairs may enact further penalties including academic suspension or expulsion from the university.

**University Policies and Services**

**Academic Code of Honesty**


At Wilkes the faculty and the entire University community share a deep commitment to academic honesty and integrity. The following are considered serious violations and are not be tolerated:

1. **Plagiarism** - the use of another’s ideas, programs, or words without proper acknowledgment.
2. **Collusion** - improper collaboration with another in preparing assignments, computer programs, or in taking examinations.
3. **Cheating** - giving improper aid to another, or receiving such aid from another, or from some other source.
4. **Falsifying** - the fabrication, misrepresentation, or alteration of citations, experimental data, laboratory data, or data derived from other empirical methods.

Instructors are expected to report violations to both the Dean of Students and the Provost.

**Methods of Assessment**


Wilkes recognizes eight numerical grades for academic achievement as follows:

**Grade Interpretation**

- 4.00 Academic achievement of outstanding quality
- 3.50 Academic achievement above high quality
- 3.00 Academic achievement of high quality
- 2.50 Academic achievement above acceptable quality in meeting requirements for graduation
- 2.00 Academic achievement of acceptable quality in meeting requirements for graduation
- 1.50 Academic achievement above the minimum quality required for course credit
- 1.00 Academic achievement of minimum quality for course credit
- 0.00 Academic achievement below the minimum quality for course credit (i.e. failure of the course)

The following letter grades may be assigned, as appropriate:

- P Passing, no credit
- W Withdrawal
- N Audit, no credit
- X Incomplete (please note than an incomplete will automatically be converted to a 0.0 by the registrar’s office if not completed within 4 weeks of the end of the semester).

**Library Resources**

http://www.wilkes.edu/bulletin/current/undergraduate/introduction/academic-resources-support-services/univ-library.aspx

The Eugene S. Farley Library services are available online 24/7 at http://wilkes.edu/library or by clicking the Libraries tab in the MyWilkes Portal.

**Writing Center**

http://www.wilkes.edu/bulletin/current/undergraduate/introduction/academic-resources-support-services/univ-writing.aspx

The University Writing Center, located in the Alden Learning Commons (lower level of the Farley Library), is available to all Wilkes students who seek personal assistance with writing. Instructors may refer students to the Center for help in honing their writing skills.

**Tutoring and Academic Support Services**

http://www.wilkes.edu/academics/colleges/university-college/academic-support-services/index.aspx
The University College Academic Support Program provides comprehensive academic support services to promote undergraduate student academic excellence and success. Students engage in active learning, reflection, and collaboration through academic support services that teach foundational skills and strategies and promote independence to achieve academic, personal, and lifelong success.

**Disability Support Services**  

If you are an individual with a disability, contact our Disability Support office as early as possible. In order to receive accommodations, you must provide appropriate documentation of your disability. As documentation takes time to gather and review, it is in your best interest to provide your documentation as early as possible so that appropriate accommodations can be set in place when they are needed. To learn more about disability services and the accommodations process, please contact the office at your earliest convenience. They are located on the 3rd floor of Conyngham Hall. You can reach Katy Betnar, the Disability Support coordinator by calling (570) 408-4150 or by email.

**Nondiscrimination Policy**  

Wilkes University prohibits discrimination in its educational programs, employment, admissions or any activities on the basis of race, color, national or ethnic origin, age, religion, disability, pregnancy, gender, gender identity and/or expression, sexual orientation, marital or family status, military or veteran status, genetic information, or any other characteristic protected under applicable federal, state or local laws. Discriminatory conduct including sexual harassment and other sexual misconduct or violence such as rape, sexual assault, sexual exploitation and coercion will not be tolerated.
**Instructor:** Dr. Carole E. Baddour  
Office: SLC 360 Phone: 570-408-4935  
Email: carole.baddour@wilkes.edu  
Office Hours: TBD

**General Information:** This three credit course is required for all ME majors. Meeting times are as follows:  
Section B - M,W 12:00 – 1:50 am SLC 216  
Section D - M,W 2:00 – 3:50 pm SLC 216  
Section E1 - M,W 4:00 – 5:50 am SLC 216

**Prerequisites:** MTH-100 or co-requisite MTH-111

**Text:** Hanly, J. and Koffman, E., *C Program Design for Engineers* 2nd ed.

**Catalog description:** An introduction to computer techniques for engineering design and analysis of components. Mechanisms, systems, and processes. Utilization of computer software packages in problem solving, performance evaluations, demonstration, trouble shooting, and determination of the interrelationships among system components as well as processes.

**Topics covered:** This course does not seek to teach the student proficiency in a specific programming language. Rather its intent is to give the student an understanding of the fundamental concepts that underlay the languages and packages the student may encounter throughout their engineering career, giving them the knowledge to better understand and use those tools. The concepts will be illustrated through the use of Excel, C, and MATLAB.

**Learning objectives:**  
- Development of algorithms and using the software development method  
- Excel: basic understanding and using to solve mathematical and engineering problems  
- Concepts of variables, data types, math and logical operators  
- Concepts of decision, selection, and repetition structures  
- Concepts of functions and their use and design  
- Basics of input/output and file processing  
- Use of Arrays, single and multidimensional  
- Concepts of numerical methods and OOP  
- MATLAB: basic understanding and using to solve mathematical and engineering problems
**Course outcomes:** The Accreditation Board of Engineering and Technology (ABET) sets out a series of expectations for student outcomes in accredited programs.

a) an ability to apply knowledge of mathematics, science and engineering  
b) an ability to design and conduct experiments, as well as to analyze and interpret data  
c) an 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  
d) an ability to function on multidisciplinary teams  
e) an ability to identify, formulate, and solve engineering problems  
f) an understanding of professional and ethical responsibility  
g) an ability to communicate effectively (3g1 orally, 3g2 written)  
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context  
i) a recognition of the need for, and an ability to engage in life-long learning  
j) a knowledge of contemporary issues  
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

<table>
<thead>
<tr>
<th>ABET Student Outcome Addressed</th>
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<tr>
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</table>

L (Low): The outcome somewhat contributes to the achievement of the course objectives  
M (Medium): The outcome contributes reasonably to the achievement of the course objectives  
H (High): The outcome strongly contributes to the achievement of the course objectives

**Classroom Decorum:** It is expected that you will not be late for class and will not display disruptive behavior. Cell phones are to be turned off or silenced at the start of class. Cell phones should be out of sight (in your bag) during any quiz or exam. If you are caught looking at your cell phone during a quiz or an exam, you will automatically get a 0%.

**Grading and attendance:** Students are expected to attend all scheduled classes. Excessive absences can affect your course grade. If you are absent for any reason, you are responsible for getting notes, handouts, and any announcements. Your grade will be based on the following:

- Exams (3) 15% each (total 45%)  
- Final Exam 20%  
- Quizzes 10%  
- Worksheets 15%  
- Attendance and Participation 10%

Quizzes and worksheets will occur roughly every week.

The final course grade will be determined as follows: ≥ 90% = 4.0; 85-89.9% = 3.5; 80-84.9% = 3.0; 75-79.9% = 2.5; 70-74.9% = 2.0; 65-69.9% = 1.5; 60-64.9% = 1.0; < 60% = 0.0
**Course Schedule:** Proposed, may be adjusted or changed as term progresses

<table>
<thead>
<tr>
<th>Week of</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 15th</td>
<td>Class cancelled (snow day)</td>
</tr>
<tr>
<td>January 22nd</td>
<td>Ch. 1 (Introduction)</td>
</tr>
<tr>
<td></td>
<td>Supplemental (Excel)</td>
</tr>
<tr>
<td>January 29th</td>
<td>Supplemental (Excel)</td>
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<tr>
<td></td>
<td>2.1 - 2.5 (Overview of C)</td>
</tr>
<tr>
<td>February 5th</td>
<td>3.1 - 3.4 (Data Types and Operators) <strong>2/7 Exam #1</strong></td>
</tr>
<tr>
<td>February 12th</td>
<td>4.1 – 4.7 (Selection)</td>
</tr>
<tr>
<td>February 19th</td>
<td>5.1 – 5.8 (Repetition and Looping)</td>
</tr>
<tr>
<td>February 26th</td>
<td>3.5 (Functions)</td>
</tr>
<tr>
<td></td>
<td>6.1 – 6.7 (Functions) <strong>2/28 Exam #2</strong></td>
</tr>
<tr>
<td>March 5th</td>
<td></td>
</tr>
<tr>
<td>March 12th</td>
<td>10.1 – 10.3 (Input/Output)</td>
</tr>
<tr>
<td>March 19th</td>
<td>7.1 – 7.7 (Arrays)</td>
</tr>
<tr>
<td></td>
<td>8.1, 8.2 (Arrays)</td>
</tr>
<tr>
<td>March 26th</td>
<td>12.1 – 12.6 (Numerical methods and OOP)</td>
</tr>
<tr>
<td>April 2nd</td>
<td>Supplemental (MATLAB) <strong>4/4 Exam #3</strong></td>
</tr>
<tr>
<td>April 9th</td>
<td>Supplemental (MATLAB)</td>
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<tr>
<td>April 16th</td>
<td>Supplemental (MATLAB)</td>
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<tr>
<td>April 23rd</td>
<td>Supplemental (MATLAB)</td>
</tr>
<tr>
<td>April 30th</td>
<td>Supplemental (MATLAB)</td>
</tr>
</tbody>
</table>

**Accommodations:** Wilkes University is committed to providing equal educational opportunity for all students who meet the academic admissions requirements. If you are an individual with a disability, contact Wilkes Disability Support Services as early as possible. Available accommodations include note-taking help and a quiet exam environment. Wilkes Disability Support Services office is located on the 3rd floor of Conyngham Hall. Contact Sandra Rendina, the Disability Support coordinator by calling (570) 408-4150 or by email (sandra.rendina@wilkes.edu).

**Tutoring:** Free tutoring is available at the Wilkes University Learning Center. The Writing Center provides basic and advanced assistance in all aspects of writing and communication.

**Academic Integrity:** Cheating of any kind will not be tolerated. For the first occurrence, cheating on an exam or quiz will result in the letter grade of F (0%) on that assignment. A second offense will result in failure for the course. All instances of academic dishonesty will be reported to the Dean of Students and the Provost. Refer to the Student Handbook for details.