May 11, 2015

To: Dean Van Galen, Chancellor
    116 North Hall
    University of Wisconsin-River Falls

From: David P. Rainville, Chair
      Faculty Senate
      University of Wisconsin-River Falls

Re: UWRF Faculty Senate Motion 2014-15/87

At the May 6, 2015 meeting of the University of Wisconsin-River Falls Faculty Senate, motion 2014-15/87 was passed and is effective immediately. The motion is forwarded to you for your action.

A motion from the Academic Policy and Program Committee (James Zimmerman, Chair) to approve program changes to the Applied Physics for Industry and Engineering (Change in Credits, Change in Emphasis/Option). See attached.

Approved ☑

Disapproved

______________________________________  5/14/15
Dean Van Galen, Chancellor              Date
TRANSMITTAL for UNDERGRADUATE PROGRAMS:
Changes or Proposals

I. INFORMATION:

1. Program Title: Applied Physics for Industry and Engineering
2. Department(s): Physics
3. College(s): Arts and Sciences
4. Proposal prepared by: Jim Madsen (Date: March 27, 2015)
5. Check all that apply:
   - New program
   - Change in course name
   - Change in major
   - Change in course content
   - Existing program
   - Change in number of credits
   - Change in minor
   - Change in emphasis/option

6. Other Programs/Departments Consulted (Requires letters of comment from all Departments or Programs substantially affected):
   a) ACCT/CSIS
   b) PSYCH/BIOL
   c) MARC/COMS
   d) MATH/GENG

7. Catalog year (and semester) of Implementation:
   Semester Fall
   Year 2015

8. Have all courses in this program been approved? Yes ☑ No □
   If "No" which courses have not been approved? PHYS 485 (changes to existing course)

9. Attach Request Narrative
   Include in narrative on attached pages a rationale for the requested changes or creation of program.
   Include clarification concerning any courses that have not yet been approved. If requesting a
   program change also include a listing of course array for both the current and proposed program.

10. UNIT APPROVALS: Requires signatures of all Department Chairs and Deans whose programs will
    be substantially affected by the changes or proposal. Signature lines for the affected Departments and
    Colleges (noted in "6" above), are on the addendum to this form. These signatures should be obtained
    prior to review by all other shared governance levels.

   Department Curriculum Committee Chair (optional)
   Date

   Department/Program Chair
   Date

   College Curriculum Committee Chair
   Date

   Dean of College
   Date

   University Curriculum Cmmt. Chair
   Date

   Academic Policy & Program Cmmt. Chair
   Date

   Faculty Senate Chair
   Date

   Provost / Vice Chancellor
   Date

   Chancellor
   Date

   *NOTE: The master copy of this transmittal & accompanying documents must be filed in the Provost’s office upon
   final approval. The Provost’s office will notify all appropriate administrative offices [Registrar, Dean(s), Department
   Chair(s)] of approvals & necessary actions to implement changes.

   Revised December 2012
TRANSMITTAL for UNDERGRADUATE PROGRAMS: Changes or Proposals - Addendum

Signatures of Additional Department & Colleges Affected

Department Chair ___________________________  Signature ______________    Date 3/30/2015
Dean of College ____________________________

Department Chair ___________________________  Signature ______________    Date 3/30/2015
Dean of College ____________________________

Department Chair ___________________________  Signature ______________    Date 4-8-15
Dean of College ____________________________
TRANSMITTAL for UNDERGRADUATE PROGRAMS: Changes or Proposals - Addendum

Signatures of Additional Department & Colleges Affected

Department Chair: [Signature] Date: 3/27/15

Dean of College: ____________________________

Department Chair: [Signature] Date: 3/27/15

Dean of College: ____________________________

Department Chair: [Signature] Date: 3/27/15

Dean of College: ____________________________

Revised December 2012
<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Director</td>
<td>James</td>
<td>3.31.15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dean of College</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Coffman</td>
<td></td>
<td>4.3.15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dean of College</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dean of College</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Revised December 2012
Applied Physics for Industry and Engineering (APIE) will be the new name of the revamped existing Applied Physics option that provides more flexibility for students to tailor their program to fit future careers. It is a four-year program to prepare highly-competitive graduates for industry jobs, entrance into graduate school, or start a business. Students will learn and apply general physics concepts to real-world problems with increasingly sophistication through a scaffolded approach. Students will develop proficiency with technical writing, professional communication, and focused skills in at least one of four selected certificate areas (13-16 credits)—Opto-Electronics, Biology, Entrepreneurship, Mechanical Design.

Roughly three years ago we started seriously looking at improving the applied option, and came up with the APIE plan based on alumni and external physics advisory board input that provided valuable guidance. Colleagues in the departments that will contribute certificate courses were also extremely helpful. We are submitting paperwork to rename PHYS 485 Senior Seminar to Capstone Design, and also changing PHYS 485 so that it is repeatable for APIE.

This is the existing Applied Physics option.

**Physics Core Requirements: 26 cr. hrs.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Crs</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 131</td>
<td>Calculus-Based Physics I</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 132</td>
<td>Calculus-Based Physics II</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 204</td>
<td>Intermediate Physics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 264</td>
<td>Modern Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 301</td>
<td>Advanced Physics Laboratory I (writing intensive)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 302</td>
<td>Advanced Physics Laboratory II (writing intensive)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 311</td>
<td>Electronics: Circuits and Devices</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 485</td>
<td>Seminar (writing intensive)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Applied Physics Option: 50 Total Credits**

Recommended as preparation for a career in an industrial or government laboratory, or for graduate study in Applied Physics, Electronics, Engineering Physics, and Geophysics.

**Core Requirements 26 cr. hrs.**

**Required Courses in Physics 24 cr. hrs.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Crs</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 250</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 252</td>
<td>Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 254</td>
<td>Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 279</td>
<td>Introduction to Internships</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 312</td>
<td>Electronics: Linear Integrated Circuits</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 313</td>
<td>Digital Electronics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 361</td>
<td>Mathematics of Physics and Engineering I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 362</td>
<td>Mathematics of Physics and Engineering II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Required Supporting Courses: 14 cr. hrs.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Crs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 166</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 167</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 331</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>Scientific Programming</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or CSIS 162 Programming II</td>
<td></td>
</tr>
</tbody>
</table>
The new version maintains the physics core, reduces the required courses to 17 from 26 credit hours, and adds a requirement to complete a certificate option in at least one of four areas. A second semester of Capstone Design Course is added to provide an extensive design experience. The number of required supporting courses increases in lieu of requiring a mathematics minor.

Applied Physics for Industry and Engineering Option: 64-59 Total Credits
Prepares highly-competitive graduates for industry, graduate school, or starting a new business. Provides a firm physics foundation with written and oral professional communication proficiency, and focused skills in at least one of four selected certificate areas—Opto-Electronics, Biology, Entrepreneurship, Mechanics.

Core Requirements 26 cr. hrs. (UNCHANGED)
Required Courses 17 cr. hrs.

<table>
<thead>
<tr>
<th>Course</th>
<th>#</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 211</td>
<td>Scientific Programming</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 279</td>
<td>Introduction to Internships</td>
<td>1 cr.</td>
</tr>
<tr>
<td>PHYS 361</td>
<td>Mathematics of Physics and Engineering I</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 362</td>
<td>Mathematics of Physics and Engineering II</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 485</td>
<td>Capstone Design Course* (Second Semester)</td>
<td>1 cr.</td>
</tr>
<tr>
<td></td>
<td>Directed Electives**</td>
<td>6 cr.</td>
</tr>
</tbody>
</table>

* Taken twice, with a mid-project presentation at the end of the first semester.

** These electives broaden experience by exploring an additional area of interest or deepen knowledge in one area. Completion of a second certificate is also an option.

Choose one of the following certificate options 13-16 cr. hrs.

<table>
<thead>
<tr>
<th>Certificate (Credits)</th>
<th>Course #</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opto-Electronics (16)</td>
<td>PHYS 312</td>
<td>Digital Electronics</td>
</tr>
<tr>
<td></td>
<td>PHYS 313</td>
<td>Analog Electronics</td>
</tr>
<tr>
<td></td>
<td>PHYS 420</td>
<td>Optics</td>
</tr>
<tr>
<td></td>
<td>PHYS 442</td>
<td>Electricity &amp; Magnetism</td>
</tr>
<tr>
<td>Biology (14)</td>
<td>BIOL 160</td>
<td>General Biology</td>
</tr>
<tr>
<td></td>
<td>BIOL 240</td>
<td>Cell &amp; Molecular Biology</td>
</tr>
<tr>
<td></td>
<td>BIOL 341</td>
<td>Anatomy &amp; Physiology I</td>
</tr>
<tr>
<td></td>
<td>BIOL 464</td>
<td>Stem Cells &amp; Regenerative Medicine</td>
</tr>
<tr>
<td>Entrepreneurship (15)</td>
<td>CSIS 215</td>
<td>Info Systems for Bus. Management</td>
</tr>
<tr>
<td></td>
<td>MARC 200</td>
<td>Intro to Marketing Communications</td>
</tr>
<tr>
<td></td>
<td>ACCT 231</td>
<td>Accounting</td>
</tr>
<tr>
<td></td>
<td>PSYCH 250</td>
<td>Industrial &amp; Organizational Psychology</td>
</tr>
<tr>
<td></td>
<td>COMS 318</td>
<td>Communication &amp; Leadership</td>
</tr>
<tr>
<td>Mechanical Design (13)</td>
<td>PHYS 250</td>
<td>Statics</td>
</tr>
<tr>
<td></td>
<td>PHYS 252</td>
<td>Dynamics</td>
</tr>
<tr>
<td></td>
<td>PHYS 254</td>
<td>Mechanics of Materials</td>
</tr>
<tr>
<td></td>
<td>GENG 305</td>
<td>Machine Design Lab</td>
</tr>
<tr>
<td></td>
<td>GENG 345</td>
<td>Machine Design</td>
</tr>
</tbody>
</table>

Required Supporting Courses: 20 cr. hrs.

<table>
<thead>
<tr>
<th>Course</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 166</td>
<td>Calculus I</td>
</tr>
<tr>
<td>MATH 167</td>
<td>Calculus II</td>
</tr>
<tr>
<td>MATH 266</td>
<td>Calculus III</td>
</tr>
<tr>
<td>MATH 256</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>MATH 331</td>
<td>Differential Equations</td>
</tr>
<tr>
<td>GENG 121</td>
<td>Engineering Drawing</td>
</tr>
<tr>
<td></td>
<td>Or GENG 265</td>
</tr>
</tbody>
</table>
Approvals from Consulted Departments
Psychology

Travis Tubre
To: James Madsen

This looks good. Thanks!

From: James Madsen
Sent: Friday, March 27, 2015 10:32 AM
To: Travis Tubre
Subject: Changes to Applied Physics Option

Hi Travis,
I have attached a description of the changes to the applied physics option that we have discussed. We will include PSYCH 250 in the entrepreneurship certificate courses so I need an email from you verifying that you support this. I will stop by and get a signature on the form as well.

Thanks,
Jim

Marketing Communications

James Pratt
To: James Madsen

Bless you, my son; go and sin no more. Anyway, it looks like a good mix of courses for applied physicists, and we approve.

Jim

From: James W. Pratt, Director
Marketing Communications Program
715-425-3899 Fax 715-425-0658
James.W.Pratt@uwrf.edu

From: James Madsen
Sent: Monday, March 23, 2015 3:25 PM
To: Charles Corcoran; James Pratt; Jennifer Willi-Rivera; Travis Tubre
Subject: Revised Applied Physics Major

Dear Charlie, Jim, Jennifer, and Travis:

As part of the revisions we proposing to our applied physics major, we will provide one of 4 options that will give students a 12 credit concentration of related courses. We are starting with 4 choices, Opt-electronics, Biology, Mechanics, and Business and Entrepreneurship.

I am contacting you to get input and hopefully your blessing to proceed and include the following courses in the Business and Entrepreneurship concentration area.

New Courses:

1. Opt-electronics:
   - Introduction to Optics
   - Laser Physics
   - Fiber Optics

2. Biology:
   - Molecular Biology
   - Cell Biology
   - Biophysics

3. Mechanics:
   - Classical Mechanics
   - Quantum Mechanics
   - Thermodynamics

4. Business and Entrepreneurship:
   - Business Law
   - Entrepreneurship
   - Business Ethics

Please let me know your thoughts and if you have any suggestions or changes.

Thank you,
Jim
Speech and Communication Arts

Mon 3/23/2015 3:41 PM

Jennifer Willis-Rivera

Re: Revised Applied Physics Major

To: James Madson

You replied to this message on 3/27/2015 10:20 AM.

This works fine for us!

Jennifer

Biology

Fri 3/27/2015 12:26 PM

Mark Bergland

Re: Changes to Applied Physics option

To: James Madson

Hi Jim,

I approve of your changes to the Applied Physics option, in terms of the Biology courses listed, and feel that it is a valuable program to have at UWRP.

Mark

Mark Bergland, Chair
Biology Department, AGS 410
University of Wisconsin-River Falls
River Falls, WI 54022
mark.s.bergland@uwrf.edu
715-425-3591 (office) or 715-529-9845 (cell)

Computer Science and Information Systems

Fri 3/27/2015 11:34 AM

Hossein Najafi

Re: Thank you and CBE letter of support: Revised Applied Physics Major

To: James Madson

Cc: Dawn Nula & Charles Cocconi

You replied to this message on 3/27/2015 11:34 AM.

No concerns from the CSIS. I will be in my office on Monday between 8 and 11. Otherwise, Tuesday after 11. Alternatively, I can sign and return via campus mail.
are you in now, Jim? happy to stop by...

Charlie

Charlie Corcoran, Ph.D., CFA
Professor and Chair
Dept. of Accounting and Finance
University of Wisconsin - River Falls
w 715-425-3395
m 651-295-0987

From: James Madsen
Sent: Friday, March 27, 2015 10:28 AM
To: Dawn Hukai
Cc: Charles Corcoran; Hossein Najafi
Subject: Re: Thank you and CBE letter of support: Revised Applied Physics Major

Hi Dawn, Charlie and Hossein:
I have attached the description of the changes to the applied physics options I will include when I submit the request to APP. I included CSIS 215 in the Entrepreneurship certificate as suggested by Dawn.
I need to stop by and get signatures from you Charlie and Hossein. Let me know a good time.
Thanks!
Jim

CBE Dean's Office

To: James Madsen
Cc: Charles Corcoran; Dawn Hukai

Dear Jim,

Thank you for agreeing to remove the word 'business' from the 'business and Entrepreneurship' concentration within the proposed Industry and Engineering Physics major, a revision of the current applied physics major. An 'Entrepreneurship' concentration in the context of an Industry and Engineering Physics major will not be mistaken for a business major, and the College supports the revision.

Thank you,
Dawn Hukai
Associate Dean
College of Business and Economics
Jim,
GENG 305.
Check- We are re-mapping our courses in the AET major as well end cleaning out obsolete ones like the old 151/161.

A couple things on the certificates for the new APIED-
Mechanical Design would be a good title for the "Mechanics" certificate.
We are creating a new GENG346 3cr Machine Design II for the new Engineering program, that would fill it out nicely to 16cr (at a later date).
We would like "Required Supporting Courses" to require GENG 121 or GENG 205, where the solid-modeling GENG 205 would be better for anyone who will use SolidWorks, Pro-E, Inventor, etc on the job. That would definitely be the Mechanical Design students, for example. GENG 121 is better for 2D people, like civil engineers, or in cases where they just need an Introduction to CAD.

With the above tweaks we fully support the new Applied Physics for Industry and Engineering Option

Thanks
Joe

Mathematics
Pending
Kelly,  
Here is the email from Bob Coffman regarding the program change for Physics.  
Lowell

Hi Lowell,

I'm sorry to be so late getting back to you. At its Monday, April 6th meeting, the Mathematics Department met to discuss the changes that you propose to your Applied Physics option. Our department is unanimous in its support of these changes.

Bob Coffman, Chair  
Department of Mathematics  
University of Wisconsin - River Falls  
(715) 425-3326

Bob,  
Jim said that the Math Dept. was meeting (today?) and would discuss the changes to the Applied Physics option. Did that happen?

Thank you,  
Lowell
TRANSMITTAL for UNDERGRADUATE PROGRAMS:
Changes or Proposals

I. INFORMATION:
1. Program Title: Applied Physics for Industry and Engineering
2. Department(s): Physics
3. College(s): Arts and Sciences
4. Proposal prepared by: Jim Madsen Date: March 27, 2015
5. Check all that apply
   □ New program
   □ Change in course name
   □ Change in major
   □ Change in course content
   ✔ Existing program
   ✔ Change in number of credits
   □ Change in minor
   ✔ Change in emphasis/option

6. Other Programs/Departments Consulted (Requires letters of comment from all Departments or Programs substantially affected):
   a.) ACCT/CSIS  b.) PSYCH/BIOL  c.) MARC/COMS  d.) MATH/GENG

7. Catalog year (and semester) of Implementation:
   Semester Fall  Year 2015

8. Have all courses in this program been approved? Yes □ No ✔
   If “No” which courses have not been approved? PHYS 485 (changes to existing course)

9. Attach Request Narrative
   Include in narrative on attached pages a rationale for the requested changes or creation of program.
   Include clarification concerning any courses that have not yet been approved. If requesting a
   program change also include a listing of course array for both the current and proposed program.

10. UNIT APPROVALS: Requires signatures of all Department Chairs and Deans whose programs will
    be substantially affected by the changes or proposal. Signature lines for the affected Departments and
    Colleges (noted in “6” above), are on the addendum to this form. These signatures should be obtained
    prior to review by all other shared governance levels.

<table>
<thead>
<tr>
<th>Department Curriculum Committee Chair (optional)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department/Program Chair</td>
<td></td>
<td>3/30/15</td>
</tr>
<tr>
<td>College Curriculum Committee Chair</td>
<td></td>
<td>4/8/15</td>
</tr>
<tr>
<td>Dean of College</td>
<td></td>
<td>3/8/15</td>
</tr>
<tr>
<td>University Curriculum Cmtt. Chair</td>
<td>Alex</td>
<td>4/8/2015</td>
</tr>
<tr>
<td>Academic Policy &amp; Program Cmtt. Chair</td>
<td></td>
<td>4/20/15</td>
</tr>
<tr>
<td>Faculty Senate Chair</td>
<td></td>
<td>5/6/2015</td>
</tr>
<tr>
<td>Provost / Vice Chancellor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chancellor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NOTE: The master copy of this transmittal & accompanying documents must be filed in the Provost’s office upon final approval. The Provost’s office will notify all appropriate administrative offices [Registrar, Dean(s), Department Chair(s)] of approvals & necessary actions to implement changes.

Revised December 2012
TRANSMITTAL for UNDERGRADUATE PROGRAMS: Changes or Proposals - Addendum

Signatures of Additional Department & Colleges Affected

Department Chair ___________________________ Signature ___________________________ Date 3/30/2015
Dean of College ______________________________

Department Chair ___________________________ Signature ___________________________ Date 3/30/2015
Dean of College ______________________________

Department Chair ___________________________ Signature Joseph Michel ___________________________ Date 4-8-15
Dean of College ______________________________

Revised December 2012
TRANSMITTAL for UNDERGRADUATE PROGRAMS: Changes or Proposals - Addendum

Signatures of Additional Department & Colleges Affected

Department Chair ___________________________ Signature ___________________________ Date 3/27/15

Dean of College ___________________________

---------------------------------------------

Department Chair ___________________________ Signature ___________________________ Date 3/27/15

Dean of College ___________________________

---------------------------------------------

Department Chair ___________________________ Signature MSB ___________________________ Date 3/27/15

Dean of College ___________________________
TRANSMITTAL for UNDERGRADUATE PROGRAMS: Changes or Proposals - Addendum

Signatures of Additional Department & Colleges Affected

<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Director</td>
<td>James M. Hazon</td>
<td>3.31.15</td>
</tr>
</tbody>
</table>

Dean of College

-----------------

<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert Coffman</td>
<td></td>
<td>4-8-15</td>
</tr>
</tbody>
</table>

Dean of College

-----------------

<table>
<thead>
<tr>
<th>Department Chair</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dean of College

-----------------

Revised December 2012


Applied Physics for Industry and Engineering (APIE) will be the new name of the revamped existing Applied Physics option that provides more flexibility for students to tailor their program to fit future careers. It is a four-year program to prepare highly-competitive graduates for industry jobs, entrance into graduate school, or start a business. Students will learn and apply general physics concepts to real-world problems with increasingly sophistication through a scaffolded approach. Students will develop proficiency with technical writing, professional communication, and focused skills in at least one of four selected certificate areas (13-16 credits)--Opto-Electronics, Biology, Entrepreneurship, Mechanical Design.

Roughly three years ago we started seriously looking at improving the applied option, and came up with the APIE plan based on alumni and external physics advisory board input that provided valuable guidance. Colleagues in the departments that will contribute certificate courses were also extremely helpful. We are submitting paperwork to rename PHYS 485 Senior Seminar to Capstone Design, and also changing PHYS 485 so that it is repeatable for APIE.

This is the existing Applied Physics option.

**Physics Core Requirements: 26 cr. hrs.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 131</td>
<td>Calculus-Based Physics I</td>
<td>5 cr.</td>
</tr>
<tr>
<td>PHYS 132</td>
<td>Calculus-Based Physics II</td>
<td>5 cr.</td>
</tr>
<tr>
<td>PHYS 204</td>
<td>Intermediate Physics Laboratory</td>
<td>1 cr.</td>
</tr>
<tr>
<td>PHYS 264</td>
<td>Modern Physics</td>
<td>4 cr.</td>
</tr>
<tr>
<td>PHYS 301</td>
<td>Advanced Physics Laboratory I (writing intensive)</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 302</td>
<td>Advanced Physics Laboratory II (writing intensive)</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 311</td>
<td>Electronics: Circuits and Devices</td>
<td>4 cr.</td>
</tr>
<tr>
<td>PHYS 485</td>
<td>Seminar (writing intensive)</td>
<td>1 cr.</td>
</tr>
</tbody>
</table>

**Applied Physics Option: 50 Total Credits**

Recommended as preparation for a career in an industrial or government laboratory, or for graduate study in Applied Physics, Electronics, Engineering Physics, and Geophysics.

**Core Requirements 26 cr. hrs.**

**Required Courses in Physics 24 cr. hrs.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 250</td>
<td>Statics</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 252</td>
<td>Dynamics</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 254</td>
<td>Mechanics of Materials</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 279</td>
<td>Introduction to Internships</td>
<td>1 cr.</td>
</tr>
<tr>
<td>PHYS 312</td>
<td>Electronics: Linear Integrated Circuits</td>
<td>4 cr.</td>
</tr>
<tr>
<td>PHYS 313</td>
<td>Digital Electronics</td>
<td>4 cr.</td>
</tr>
<tr>
<td>PHYS 361</td>
<td>Mathematics of Physics and Engineering I</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 362</td>
<td>Mathematics of Physics and Engineering II</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>

**Required Supporting Courses: 14 cr. hrs.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 166</td>
<td>Calculus I</td>
<td>4 cr.</td>
</tr>
<tr>
<td>MATH 167</td>
<td>Calculus II</td>
<td>4 cr.</td>
</tr>
<tr>
<td>MATH 331</td>
<td>Differential Equations</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 211</td>
<td>Scientific Programming or CSIS 162 Programming II</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>


The new version maintains the physics core, reduces the required courses to 17 from 26 credit hours, and adds a requirement to complete a certificate option in at least one of four areas. A second semester of Capstone Design Course is added to provide an extensive design experience. The number of required supporting courses increases in lieu of requiring a mathematics minor.

Applied Physics for Industry and Engineering Option: 48-59 Total Credits
Prepares highly-competitive graduates for industry, graduate school, or starting a new business. Provides a firm physics foundation with written and oral professional communication proficiency, and focused skills in at least one of four selected certificate areas—Opto-Electronics, Biology, Entrepreneurship, Mechanics.

Core Requirements 26 cr. hrs. (UNCHANGED)

Required Courses 17 cr. hrs.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 211</td>
<td>Scientific Programming</td>
<td>3 cr.</td>
</tr>
<tr>
<td>or CSIS 162</td>
<td>Programming II</td>
<td></td>
</tr>
<tr>
<td>PHYS 279</td>
<td>Introduction to Internships</td>
<td>1 cr.</td>
</tr>
<tr>
<td>PHYS 361</td>
<td>Mathematics of Physics and Engineering I</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 362</td>
<td>Mathematics of Physics and Engineering II</td>
<td>3 cr.</td>
</tr>
<tr>
<td>PHYS 485</td>
<td>Capstone Design Course* (Second Semester)</td>
<td>1 cr.</td>
</tr>
<tr>
<td></td>
<td>Directed Electives**</td>
<td>6 cr.</td>
</tr>
</tbody>
</table>

* Taken twice, with a mid-project presentation at the end of the first semester.
** These electives broaden experience by exploring an additional area of interest or deepen knowledge in one area. Completion of a second certificate is also an option.

Choose one of the following certificate options 13-16 cr. hrs.

<table>
<thead>
<tr>
<th>Certificate (Credits)</th>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opto-Electronics (16)</td>
<td>PHYS 312</td>
<td>Digital Electronics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHYS 313</td>
<td>Analog Electronics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHYS 420</td>
<td>Optics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHYS 442</td>
<td>Electricity &amp; Magnetism</td>
<td>4</td>
</tr>
<tr>
<td>Biology (14)</td>
<td>BIOL 160</td>
<td>General Biology</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BIOL 240</td>
<td>Cell and Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BIOL 341</td>
<td>Anatomy &amp; Physiology I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BIOL 464</td>
<td>Stem Cells &amp; Regenerative Medicine</td>
<td>3</td>
</tr>
<tr>
<td>Entrepreneurship (15)</td>
<td>CSIS 215</td>
<td>Info Systems for Bus. Management</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MARC 200</td>
<td>Intro to Marketing Communications</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ACCT 231</td>
<td>Accounting</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PSYCH 250</td>
<td>Industrial &amp; Organizational Psychology</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>COMS 318</td>
<td>Communication &amp; Leadership</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical Design (13)</td>
<td>PHYS 250</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 252</td>
<td>Dynamics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 254</td>
<td>Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>GENG 305</td>
<td>Machine Design Lab</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>GENG 345</td>
<td>Machine Design</td>
<td>3</td>
</tr>
</tbody>
</table>

Required Supporting Courses: 20 cr. hrs.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 166</td>
<td>Calculus I</td>
<td>4 cr.</td>
</tr>
<tr>
<td>MATH 167</td>
<td>Calculus II</td>
<td>4 cr.</td>
</tr>
<tr>
<td>MATH 266</td>
<td>Calculus III</td>
<td>3 cr.</td>
</tr>
<tr>
<td>MATH 256</td>
<td>Linear Algebra</td>
<td>3 cr.</td>
</tr>
<tr>
<td>MATH 331</td>
<td>Differential Equations</td>
<td>3 cr.</td>
</tr>
<tr>
<td>GENG 121</td>
<td>Engineering Drawing</td>
<td>3 cr.</td>
</tr>
<tr>
<td></td>
<td>Or GENG 265</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>
Approvals from Consulted Departments
Psychology

Travis Tubre
RE: Changes to Applied Physics Option

This looks good. Thanks!

From: James Madsen
Sent: Friday, March 27, 2015 10:32 AM
To: Travis Tubre
Subject: Changes to Applied Physics Option

Hi Travis,
I have attached a description of the changes to the applied physics option that we have discussed. We will include PSYCH 250 in the entrepreneurship certificate courses so I need an email from you verifying that you support this. I will stop by and get a signature on the form as well.

Thanks,
Jim

Jim Madsen
Professor, Chair
Physics Department
UWRF
410 South Third Street
River Falls, WI 54022

Marketing Communications

James Pratt
Re: Revised Applied Physics Major

Bless you, my son; go and sin no more. Anyway, it looks like a good mix of courses for applied physicists, and we approve.

Jim

James W. Pratt, Director
Marketing Communications Program
715-425-3899 Fax 715-425-0658
james.w.pratt@uwrf.edu

From: James Madsen
Sent: Monday, March 23, 2015 3:25 PM
To: Charles Corcoran; James Pratt; Jennifer Willis-Rivera; Travis Tubre
Subject: Revised Applied Physics Major

Dear Charlie, Jim, Jennifer, and Travis:
As part of the revisions we are proposing to our applied physics major, we will provide one of 4 options that will give students a 12 credit concentration of related courses. We are starting with 4 choices, Opt-Electronics, Biology, Mechanics, and Business and Entrepreneurship.
I am contacting you to get input and hopefully your blessing to proceed and include the following courses in the Business and Entrepreneurship concentration area.
Speech and Communication Arts

Mon 3/23/2015 3:41 PM
Jennifer Willis-Rivera
Re: Revised Applied Physics Major

To James Madsen

You replied to this message on 3/27/2015 10:20 AM.

Bing Maps

This works fine for us!

Jennifer

Biology

Fri 3/27/2015 12:26 PM
Mark Bergland
Re: Changes to Applied Physics option

To James Madsen

Bing Maps

Hi Jim,

I approve of your changes to the Applied Physics option, in terms of the Biology courses listed, and feel that it is a valuable program to have at UWRF.

Mark

Mark Bergland, Chair
Biology Department, AGS 410
University of Wisconsin - River Falls
River Falls, WI 54022
mark.s.bergland@uwrf.edu
715-425-3591 (office) or 715-529-8845 (cell)

Computer Science and Information Systems

Fri 3/27/2015 11:24 AM
Hossein Najafi
Re: Thank you and CBE letter of support: Revised Applied Physics Major

To James Madsen

Cc Dawn Hulick, Charles Corcoran

You replied to this message on 3/27/2015 11:34 AM.

Bing Maps

No concerns from the CSIS. I will be in my office on Monday between 8 and 11. Otherwise, Tuesday after 11. Alternatively, I can sign and return via campus mail.

Accounting and Finance

Fri 3/27/2015 11:00 AM

Charles Corcoran

Re: Thank you and CBE letter of support: Revised Applied Physics Major

To: James Madsen

Retention Policy: Deleted items are removed in 90 days. Expires: 4/26/2015

This item will expire in 26 days. To keep this item longer apply a different Retention Policy.
You replied to this message on 3/27/2015 11:00 AM.

are you in now, Jim? happy to stop by...

Charlie

Charles Corcoran, Ph.D., CFA
Professor and Chair
Dept. of Accounting and Finance
University of Wisconsin - River Falls
w 715.425.3335
m 651.295.0987

---

From: James Madsen
Sent: Friday, March 27, 2015 10:28 AM
To: Dawn Hukai
Cc: Charles Corcoran; Hossein Najafi
Subject: RE: Thank you and CBE letter of support: Revised Applied Physics Major

Hi Dawn, Charlie and Hossein:
I have attached the description of the changes to the applied physics options I will include when I submit the request to APP. I included CSIS 215 in the Entrepreneurship certificate as suggested by Dawn.
I need to stop by and get signatures from you Charlie and Hossein. Let me know a good time.
Thanks!
Jim

CBE Dean's Office

Tue 3/24/2015 5:01 PM

Dawn Hukai

Thank you and CBE letter of support: Revised Applied Physics Major

To: James Madsen
Cc: Charles Corcoran; Darryl Miller

You replied to this message on 3/27/2015 10:28 AM.

Dear Jim,

Thank you for agreeing to remove the word 'business' from the 'business and Entrepreneurship' concentration within the proposed Industry and Engineering Physics major, a revision of the current applied physics major. An 'Entrepreneurship' concentration in the context of an Industry and Engineering Physics major will not be mistaken for a business major, and the College supports the revision.

Thank you,
Dawn Hukai
Associate Dean
College of Business and Economics
Agricultural Engineering Technology

To: James Hudson

RE: Changes to applied Physics option

Jim,

GENG 305.
Check: We are re-mapping our courses in the AET major as well and cleaning out obsolete ones like the old 151/161.

A couple things on the certificates for the new APIEO-
Mechanical Design would be a good title for the “Mechanics” certificate.
We are creating a new GENG346 3cr Machine Design II for the new Engineering program, that would fit it out nicely to 16cr (at a later date).
We would like “Required Supporting Courses” to require GENG 121 or GENG 205, where the solid-modeling GENG 205 would be better for anyone who will use SolidWorks, Pro-E, Inventor, etc on the job. That would definitely be the Mechanical Design students, for example. GENG 121 is better for 2D people, like civil engineers, or in cases where they just need an introduction to CAD.

With the above tweaks we fully support the new Applied Physics for Industry and Engineering Option

Thanks:
Joe

Mathematics
Pending
Kelly Duff-Bowers

From: Lowell McCann
Sent: Wednesday, April 08, 2015 9:23 AM
To: Kelly Duff-Bowers
Subject: FW: Applied Physics

Kelly,
Here is the email from Bob Coffman regarding the program change for Physics.
Lowell

From: Robert Coffman
Sent: Tuesday, April 07, 2015 9:04 PM
To: Lowell McCann
Cc: James Madsen
Subject: Re: Applied Physics

Hi Lowell,

I'm sorry to be so late getting back to you. At its Monday, April 6th meeting, the Mathematics Department met to discuss the changes that you propose to your Applied Physics option. Our department is unanimous in its support of these changes.

Bob Coffman, Chair
Department of Mathematics
University of Wisconsin - River Falls
(715) 425-3326

From: Lowell McCann
Sent: Tuesday, April 7, 2015 4:43 PM
To: Robert Coffman
Subject: Applied Physics

Bob,
Jim said that the Math Dept. was meeting (today?) and would discuss the changes to the Applied Physics option. Did that happen?

Thank you,
Lowell