PHYSICS, CERTIFICATE

The department offers an undergraduate certificate in physics. An understanding of the physical universe informs many disciplines. The study of physics is essential to understanding nature and to advancing technology in the coming century. A certificate in physics increases the opportunities for students to become better informed on technological issues at the local, state, national, and international levels.

The certificate is designed to serve undergraduates majoring in biology, chemistry, mathematics, engineering, education and other fields who wish to extend their study of physics beyond what may be required or recommended for their major without completing the full L&S physics major requirements.

HOW TO GET IN

To declare a certificate in physics, students must fill out a major/certificate declaration form. An undergraduate physics advisor must sign the form. The form to declare the certificate can be obtained at the Physics departmental office. All undergraduate students are eligible to declare the certificate, except those declared in the following majors: Physics, Astronomy-Physics, and Applied Mathematics, Engineering, and Physics (AMEP).

REQUIREMENTS

CERTIFICATE REQUIREMENTS

The physics certificate requires 18 credits of Intermediate or Advanced level undergraduate PHYSICS courses, with the following restrictions:

- At least 9 of the credits must be in residence.
- At most one course from each of the three semesters of an introductory sequence can be counted.
- At most 3 credits of directed study can be counted.
- Only graded courses may be used toward the certificate.
- A minimum grade point average of 2.000 is required in all certificate courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Introductory Course (complete only one):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYSICS 247</td>
<td>A Modern Introduction to Physics (recommended)</td>
<td>5</td>
</tr>
<tr>
<td>PHYSICS 207</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 201</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>E M A 201</td>
<td>Statics and Dynamics</td>
<td>1</td>
</tr>
<tr>
<td>E M A 202</td>
<td>Statics and Dynamics</td>
<td>1</td>
</tr>
</tbody>
</table>

| Second Introductory Course (complete only one):         |         |
| PHYSICS 248   | A Modern Introduction to Physics (recommended)          | 2       |
| PHYSICS 208   | General Physics                                         |         |
| PHYSICS 202   | General Physics                                         |         |

| Third Introductory Course (complete only one):          |         |
| PHYSICS 249   | A Modern Introduction to Physics                         |         |
| PHYSICS 205   | Modern Physics for Engineers                             |         |
| PHYSICS 499   | Directed Study                                          |         |
| PHYSICS 681   | Senior Honors Thesis                                     |         |
| PHYSICS 682   | Senior Honors Thesis                                     |         |
| PHYSICS 691   | Senior Thesis                                            |         |
| PHYSICS 692   | Senior Thesis                                            |         |
| Directed Study (optional, maximum 3 credits)           | 0-3     |
| PHYSICS 299   | Directed Study                                          |         |
| PHYSICS 681   | Senior Honors Thesis                                     |         |
| PHYSICS 682   | Senior Honors Thesis                                     |         |
| PHYSICS 691   | Senior Thesis                                            |         |
| PHYSICS 692   | Senior Thesis                                            |         |
| Additional Intermediate and Advanced PHYSICS courses    | 1-5     |
| PHYSICS 208   | General Physics                                         |         |
| PHYSICS 202   | General Physics                                         |         |
| PHYSICS 531   | Introduction to Quantum Mechanics                        |         |
| PHYSICS 535   | Introduction to Particle Physics                         |         |
| PHYSICS 545   | Introduction to Atomic Structure                         |         |
| PHYSICS 546   | Lasers                                                  |         |
| PHYSICS 551   | Solid State Physics                                      |         |
| PHYSICS 563   | Radionuclides in Medicine and Biology                    |         |
| PHYSICS 623   | Electronic Aids to Measurement                           |         |
| PHYSICS 625   | Applied Optics                                           |         |

Total Credits 18
A maximum of 5 credits from E M A 201, E M A 202 and M E 240 count toward the 18 credits required for the certificate.

Students may not transfer into the PHYSICS 247 - PHYSICS 248 - PHYSICS 249 sequence from another introductory sequence.

**CERTIFICATE COMPLETION REQUIREMENT**

This undergraduate certificate must be completed concurrently with the student’s undergraduate degree. Students cannot delay degree completion to complete the certificate.

**LEARNING OUTCOMES**

1. Understand basic physical principles.
2. Solve problems proficiently using both quantitative and qualitative applications of these physical principles.
3. Know how to perform quantitative measurements of physical phenomena and understand the statistical significance of observations made in the presence of statistical and systematic uncertainties.
4. Be prepared for graduate study and/or careers in STEM fields.
5. Communicate effectively with scientific peers and the public, both orally and in writing.

**ADVISING AND CAREERS**

**PHYSICS UNDERGRADUATE ADVISORS**

**Professor Jan Egedal**  
3275 Chamberlin Hall  
608-262-3628

**Professor Dan McCammon**  
6207 Chamberlin Hall  
608-262-5916

**Professor Deniz Yavuz**  
5320 Chamberlin Hall  
608-263-9399

**PHYSICS AMEP ADVISORS**

**Professor Cary Forest**  
3277 Chamberlin Hall  
608-263-0486

**Professor Robert McDermott**  
5112 Chamberlin Hall  
608-263-4476

**PEOPLE**

**FACULTY**

Yang Bai (https://www.physics.wisc.edu/people/yangbai/), Associate Professor

Baha Balantekin (https://www.physics.wisc.edu/people/bahabalantekin/), Eugene P. Wigner Professor

Vernon Barger (https://www.physics.wisc.edu/people/vernon-dbarger/), Vilas Professor and Van Vleck Professor

Keith Bechtol (https://www.physics.wisc.edu/people/keithbechtol/), Assistant Professor

Uwe Bergmann (http://www.physics.wisc.edu/people/uwebergmann/), Professor

Kevin Black (https://www.physics.wisc.edu/people/kevinblack/), Professor

Stas Boldyrev (https://www.physics.wisc.edu/people/stanislavboldyrev/), Professor

Tulika Bose (https://www.physics.wisc.edu/people/tulikabose/), Professor

Victor Brar (https://www.physics.wisc.edu/people/victorbrar/), Assistant Professor

Duncan Carlsmiti (https://www.physics.wisc.edu/people/duncancarlsmith/), Professor

Daniel Chung (https://www.physics.wisc.edu/people/daniel-jchung/), Professor

Susan Coppersmith (https://www.physics.wisc.edu/people/susanncoppersmith/), Robert E. Fassnacht Professor and Vilas Professor

Sridhara Dasu (https://www.physics.wisc.edu/people/sridharadasu/), Department Chairperson and Professor

Jan Egedal (https://www.physics.wisc.edu/people/janegedal/), Professor

Mark Eriksson (https://www.physics.wisc.edu/people/markeriksson/), Vilas Distinguished Achievement Professor

Lisa Everett (https://www.physics.wisc.edu/people/lisa-leverett/), Professor

Ke Fang (http://www.physics.wisc.edu/people/kefang/), Assistant Professor

Cary Forest (https://www.physics.wisc.edu/people/cary-bforest/), Prager Professor of Experimental Physics

Pupa Gilbert (https://www.physics.wisc.edu/people/pupagilbert/), Vilas Distinguished Achievement Professor

Francis Halzen (https://www.physics.wisc.edu/people/francis-lhalzen/), Gregory Breit Professor and Hilldale Professor

Kael Hanson (https://www.physics.wisc.edu/people/kael-dhanson/), Professor, WIPAC Director

Aki Hashimoto (https://www.physics.wisc.edu/people/akihashimoto/), Professor

Matthew Herndon (https://www.physics.wisc.edu/people/matthewfherndon/), Professor

Lev Ioffe (https://www.physics.wisc.edu/people/levioffe/), Professor

Robert Joynt (https://www.physics.wisc.edu/people/robertjjoynt/), Professor
Albrecht Karle (https://www.physics.wisc.edu/people/albrechtkarle/), Professor, IceCube Associate Director, Science and Instrumentation

Shimon Kolkowitz (https://www.physics.wisc.edu/people/shimonkolkowitz/), Assistant Professor

James Lawler (https://www.physics.wisc.edu/people/james-elawler/), Arthur and Aurelia Schawlow Professor

Alex Levchenko (https://www.physics.wisc.edu/people/alexlevchenko/), Associate Professor

Lu Lu (http://www.physics.wisc.edu/people/lulu/), Assistant Professor

Dan McCammon (https://www.physics.wisc.edu/people/danmccammon/), Professor

Robert McDermott (https://www.physics.wisc.edu/people/robert-fmcdermott/), Professor

Moritz Cornelius Muenchmeyer (http://www.physics.wisc.edu/people/moritz-corneliusmuenchmeyer/), Assistant Professor

Marshall Onellion (https://www.physics.wisc.edu/people/marshall-fonellion/), Professor

Kimberly Palladino (https://www.physics.wisc.edu/people/kimberly-jpalladino/), Assistant Professor

Yibin Pan (https://www.physics.wisc.edu/people/yibinpan/), Associate Professor

Brian Rebel (https://www.physics.wisc.edu/people/brianrebel/), Associate Professor

Mark Rzchowski (https://www.physics.wisc.edu/people/markrzchowski/), Associate Chairperson and Professor

Mark Saffman (https://www.physics.wisc.edu/people/marksaffman/), Professor

John Sarff (https://www.physics.wisc.edu/people/john-ssarff/), Professor

Gary Shiu (https://www.physics.wisc.edu/people/garyshiu/), Professor

Paul Terry (https://www.physics.wisc.edu/people/paul-wterry/), Professor

Peter Timbie (https://www.physics.wisc.edu/people/peter-ttimbie/), Professor

Justin Vandenbroucke (https://www.physics.wisc.edu/people/justinvandenbroucke/), Assistant Professor

Maxim Vavilov (https://www.physics.wisc.edu/people/maxim-gvavilov/), Professor

Thad Walker (https://www.physics.wisc.edu/people/thad-gwalker/), Professor

Sau Lan Wu (https://www.physics.wisc.edu/people/sau-lanwu/), Enrico Fermi Professor and Vilas Professor

Deniz Yavuz (https://www.physics.wisc.edu/people/denizyavuz/), Professor

Ellen Zweibel (https://www.physics.wisc.edu/people/ellen-gzweibel/), William L Kraushaar Professor of Astronomy & Physics