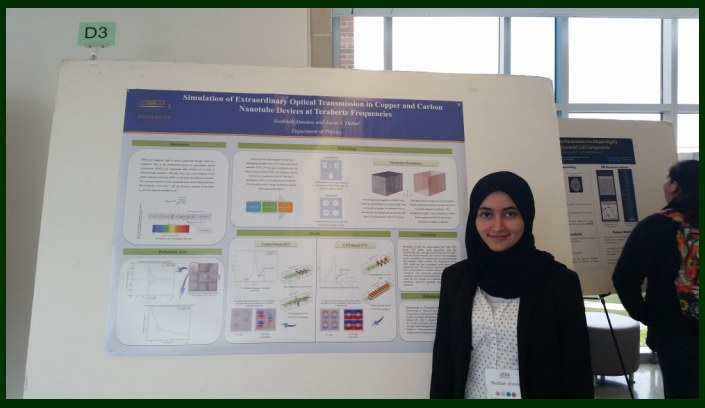
WRIGHT STATE UNIVERSITY

# DEPARTMENT OF PHYSICS

## UNDERGRADUATE STUDIES

## HANDBOOK


COLLEGE
OF
SCIENCE
AND
MATHEMATICS
WRIGHT STATE
UNIVERSITY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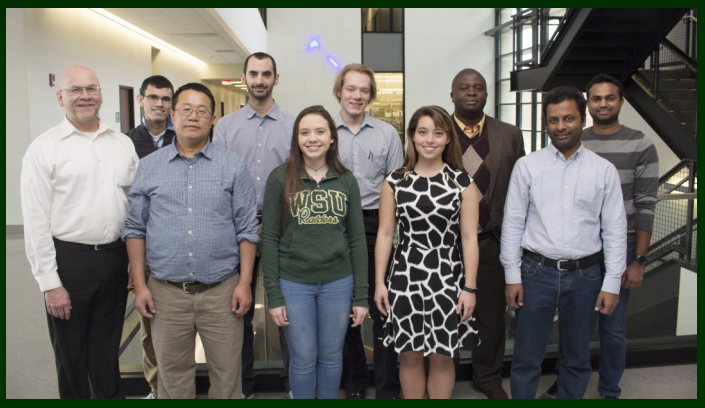

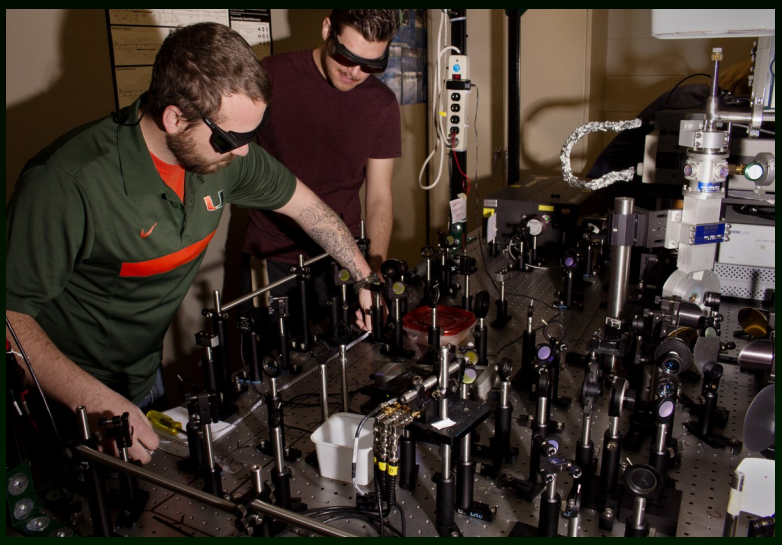

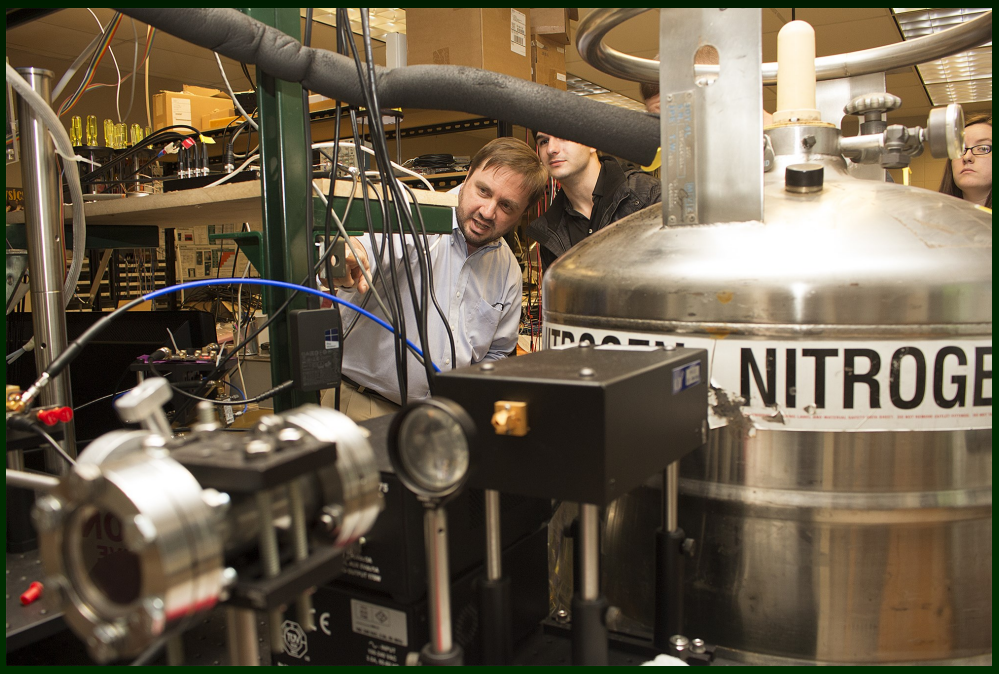
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# ***Important Info***

## *College of Science & Mathematics*
## *Department of Physics*

Wright State University
248 Fawcett Hall
3640 Colonel Glenn Hwy.
Dayton, OH 45435

Phone: (937)775-2955
Email: physics@wright.edu
Website: http://science-math.wright.edu/physics

All department and faculty offices are located in Fawcett Hall.
All campus phone numbers can be reached at (937) 775-xxxx.
All departmental email addresses are firstname.lastname@wright.edu

## Important Contact Information:

| Name | Title | Office | Email | Campus Ext. |
|---|---|---|---|---|
| **Dr. Jason Deibel** | **Chair** | **248** | **jason.deibel@** | **x2955** |
| **Dr. Brent Foy** | **Assistant Chair** | **249** | **brent.foy@** | **x2955** |
| **Mr. William Wagner** | **Laboratory Supervisor** | **239** | **william.wagner@** | **x2955** |
| **Ms. Kelly Burcham** | **Administrative Support Coordinator** | **248** | **kelly.burcham@** | **x3847** |
| **Mrs. Kim Napier** | **Administrative Specialist** | **248** | **kim.napier@** | **x2955** |

# WSU Physics Departmental Directory

| Name | Title | Office Location | Phone | Email Address |
|---|---|---|---|---|
| ***Faculty*** | | | | |
| **Jason Deibel** | **Department Chair** | **248A Fawcett** | **x2955** | **jason.deibel** |
| Elliott Brown | Professor<br>*APS Fellow, IEEE Fellow* | NEC | x2955 | elliott.brown |
| Allen Hunt | Professor | 265 Fawcett | x3116 | allen.hunt |
| Gregory Kozlowski | Professor | 253 Fawcett | x2955 | gregory.kozlowski |
| Thomas Skinner | Professor | 263 Fawcett | x4549 | thomas.skinner |
| Beth Basista | Assoc. Professor | 259 Fawcett | x2955 | beth.basista |
| Jerry Clark (Emeritus) | Assoc. Professor | 245 Fawcett | x2955 | jerry.clark |
| Brent Foy | Asst. Chair & Assoc. Professor | 249 Fawcett | x2955 | brent.foy |
| Sarah Tebbens | Assoc. Professor | 203 Fawcett | x2955 | sarah.tebbens |
| Guy Vandegrift | Assoc. Professor | 241 Dwyer (Lake Campus) | x8334 | guy.vandegrift |
| Ivan Medvedev | Assoc.. Professor | 244 Fawcett | x2561 | ivan.medvedev |
| Amit Sharma | Assoc. Professor | 241 Fawcett | x2955 | amit.sharma |
| Adrienne Traxler | Assoc. Professor | 243 Fawcett | x2955 | adrienne.traxler |
| Eric Rowley | Lecturer | 271 Fawceett | x2955 | eric.rowley |
| Ajani Ross | Instructor | 243 Fawcett | x2955 | ajani.ross |
| Jane L. Fox | Research Faculty<br>*AGU Fellow* | 269 Fawcett | x2983 | jane.fox |
| ***Staff*** | | | | |
| Kelly Burcham | Admin. Support Coordinator | 248 Fawcett | x2955 | kelly.burcham |
| Kim Napier | Admin. Specialist | 248 Fawcett | X2955 | kim.napier |
| William Wagner | Lab. Manager | 239 Fawcett | x2955 | william.wagner |

# Welcome!!!

Welcome to the Wright State University Department of Physics! The Physics department has a history of providing both undergraduate and graduate students with a great physics education as well as helping them to start careers in physics, engineering, and more! We are always actively working as faculty to improve the educational experience of our students via innovative teaching and providing exciting research, teaching, and outreach opportunities.

Please use this handbook to help familiarize yourself with the WSU Physics Department and our undergraduate programs. However, if you have questions, concerns, or need help, please come talk to us. We are located on the 2nd floor of Fawcett Hall.

WSU Physics Faculty & Staff

## Physics at Wright State University

The Physics Department at Wright State University is a medium sized department with 14 faculty. For undergraduate students, we provide a wide variety of programs in physics preparing them for either graduate school or for careers. Graduate students can choose either a Master's of Science (M.S. Physics degree), a Master's in Teaching (M.S.T. Physics degree), or a Ph.D. in Interdisciplinary Applied Sciences and Mathematics (IASM PhD degree).

The major research areas of the faculty include biophysics, computational physics, geophysics, materials science, nanotechnology, optics, physics education, plasma physics and spectroscopy. They study topics as fundamental as chemical reactions in the atmosphere of Mars to topics with societal impact such as the use of T-rays for full-body scanners at airports.

The Physics Department leads the college, the university, and the country in a variety of measures. For instance,

- three recent graduate students have received national Department of Defense SMART fellowships to pursue PhD degrees.
- A recent Alumni of our BS program won a highly competitive National Science Foundation Graduate Research Fellowship to attend graduate school
- our four national fellows (an American Geophysical Union fellow, two American Physical Society fellows, an IEEE fellow) are unmatched at WSU and, per faculty, is above some of the largest doctoral programs,
- the department has the only endowed chair position in the college,
- the external research funding received by physics faculty averages over $1M a year,
- over 25% of the faculty serve on editorial boards of international journals,
- the first ever International Conference on Zinc Oxide was organized at WSU. Zinc oxide is the next generation optical material, with applications ranging from sun creams to DVD lasers.

# Orientation: Becoming a Physics Major

There is no formal orientation process for starting any of the undergraduate Physics degree programs at Wright State University. The reason for this is that there are a myriad of ways a student can become a Physics major:

- A student can be directly admitted as a Physics major,
- A student can declare what is known as "Physics – intent"
- A student can transfer from another institution's Physics program,
- A student can take a physics general education course and get inspired,

Regardless of the path you took to becoming a Physics major, we are extremely excited that you did!

**Once you decide to be a Physics major,**

1. ***Let us know*** – you will be surprised how much it helps us if we know who our Physics students are! Besides, there is some paperwork that we will need to complete to make you an official Physics student.
2. ***Meet the chair*** – The Physics Dept. Chair is Dr. Jason Deibel. He likes to meet WSU Physics students. Stop by and introduce yourself.
3. ***Meet your undergrad advisor*** – The designated College of Science & Mathematics is Laura Bearhs. Her office is located in the 106 Oelman Hall. You may also contact her at laura.bearhs@wright.edu. She will work with you to develop a plan of courses that will help you accomplish your goal of studying Physics. She will also help you develop a list of courses and a timeline for your graduation based on your past educational experience. You should meet with your advisor at a minimum of twice a year. We highly encourage you to discuss your planning with the Chair or the Assistant Chair.
4. ***Meet the students*** – Where are the other students? Places that you can find them include your Physics classes, other courses, the WSU Physics Department computer lab, the Physics Help Room, WSU Physics Dept. functions (including seminars and receptions), the Society of Physics Students meetings, and more!
5. ***Take Physics 1000*** – This is our "Introduction to Physics" course.
6. ***Learn physics*** – Learning Physics is required if you want to get a degree in Physics.
7. ***Teach physics*** – The best way to learn is to teach. We have lots of opportunities for this including working in the Help Room, grading, teaching assistants, teaching introductory lab, and outreach opportunities (Physics demonstrations at local venues such as schools and museums).
8. ***Do physics*** – Between research opportunities with WSU Physics Faculty and the Air Force Research Lab and local companies, there are a lot of places that you can do Physics. Ask us how!

# Where do I go for information on...

## 1. Advising?

Physics majors at Wright State University are directly advised by tenured or tenure-track faculty in the department. Upon declaring a physics major, each student will be assigned a faculty advisor by the Department Chair and the Chair of the Undergraduate Studies committee. Physics majors are also informally advised through their participation in the Introduction to Physics (PHY 1000/1010) year-long course. In this experiential course, students gain skills and experiences that will help put them on a good path toward becoming a successful physics major. As part of the PHY 1000/1010 courses, students will receive academic and career advising and mentoring from not only the professor, but also other physics majors.

If you have questions regarding advising in relation to any of the undergraduate degree programs offered by the Department of Physics at WSU, please contact either the Chair or the Assistant Chair.

As a Physics major, you will be required once a semester to meet with your advisor before you register for the upcoming academic term. You have a registration PIN placed on your account preventing you from registering until you have met with your advisor. There is a form at the end of this handbook that you will complete at each of these advising sessions and return to the department office to have that PIN removed. It will be most beneficial to you to meet with your advisor at least twice every semester. What do you do if you don't know which advisor to go to? Well, go to the WSU Physics Dept. main office in 248 Fawcett Hall and ask. Someone there will be glad to help!

# Where do I go for information on...

## 2. Help with Paper Work?

Many examples of the paperwork that you might have to complete during your time as a Physics major at WSU can be found in the back of this handbook. For assistance with paperwork such as registration, over-rides, graduation applications, travel, departmental jobs, etc., a good place to start is in 248 Fawcett Hall. Go there and ask any department faculty for help. Another good person to ask is your advisor.

## 3. Help with Homework?

There are multiple resources available to you for assistance with doing well on and understanding homework and course content from your Physics Courses:

a. The Physics Help Room located in 201 Fawcett Hall
b. The Physics Computer Lab
c. Your professor. They have office hours. If you can't make his/her office hours, ask for an appointment, or email him or her.
d. Your PHY 1000 instructor, peer mentors, etc.

## 4. Help with Labs?

There are multiple resources available to you for assistance with doing well on and understanding homework and course content from your Lab Courses:

a. The teaching assistant assigned to your lab section.
b. The Help Room
c. Stop by and see William Wagner, Lab Manager- 239 Fawcett Hall

# Where do I go to for information on...

## 5. Find Research and Work Opportunities?

There are many opportunities for finding a paid position involving physics. We encourage you to seek out these possibilities as your physics education will be emboldened by such experiences and prospective employers and graduate schools like to see these things as well. As employment opportunities become available, faculty and staff will contact students. We also encourage you to speak to faculty such as the Chair or your advisor about finding employment. If you are interested in working with a faculty member in a research capacity, contact said professor.

On campus opportunities include:

- ***Grader***: Grade homework for the PHY 1100, PHY 1120, PHY 2400, PHY 2410, PHY 1050, or PHY 1060 introductory or general education courses and on some occasions or the mid-level physics majors courses.
- ***Laboratory Teaching Assistant***: Teach laboratories for the PHY 1100, PHY 1120, PHY 2400, PHY 2410, PHY 1050, or PHY 1060 introductory or general education courses.
- ***Learning Assistant***: Assist a faculty member with class instruction. This is typically associated with classes that are taught in an active learning methodology such as scale-up.
- ***Undergraduate Research Assistant***: Assist a faculty member with his or her scholarly research. Such positions can be volunteer or paid or for academic course credit. Learn more at the CoSM website for Undergraduate Research and Experiential Learning at **https://www.wright.edu/urel**

Off campus opportunities include:

- CoSM website for internships **https://www.wright.edu/urel**
- Air Force Research Laboratory Position
- SOCHE Internships (**http://www.socheintern.org/** )
- Internships with local companies
- National Science Foundation Research Experience for Undergraduate Program

**http://www.nsf.gov/crssprgm/reu/reu_search.jsp**

# Where do I go to for information on...

## 6. Find Computers and a Place to Study?

The physics department has a computer lab with access given only to physics majors. It is located in 240 Fawcett Hall. The current password for the door is 4086 and is to be kept private. This room has 10 computers and a white board. Many of the physics majors use this as a place to study, do homework, and get help from other students who have previously taken the classes. Also, when the department conference room, 242 Fawcett Hall, is not in use, students are welcome to use this room to study or eat a meal.

## 7. Hang out with fellow physics students?

There are multiple opportunities to hang out with other physics majors

- The Physics Computer Lab
- Join the Society of Physics Students
- Form a study group for one of your physics classes

(The undergraduate studies committee maintains an email list of physics majors taking PHY 2400 and 2410 to assist you with forming study groups.)

## 8. Find Help with anything else?

There are many ways to receive help in the physics department.

a. Consult this handbook
b. Ask your advisor
c. Ask any faculty in the department office
d. Ask another physics major
e. Ask one of your physics professors
f. Google ...it knows everything....

# Physics Academic Scholarship Opportunities

## Physics Scholarship

Open to: Incoming direct admit students in the physics program demonstrating financial need
Minimum GPA requirement: at least 3.0 GPA
Amount: $500 - $1000

## Gust Bambakidis Scholarship

Open to: Current, full-time freshman or sophomore, progressing toward a degree
Minimum GPA requirement: 2.75
Special requirements: Already has completed PHY 2400 and must complete the sequence while scholarship is in force
Special consideration to: Those who demonstrate exceptional involvement in Physics courses and laboratories or those in the Society of Physics Students
Amount: $500 - $1000

## Merrill L. Andrews Memorial Scholarship

Open to: Full time undergraduate physics or engineering physics major, progressing toward a degree
Minimum GPA requirement: 3.2
Special requirements: Completed more than 12 semester hours of 2000 level courses or above or have at least a 3.2 GPA in all Physics courses with 18 or more quarter hours completed in physics at level 2000 or above
Special consideration to: Those who demonstrate exceptional involvement in Physics courses and laboratories or those in the Society of Physics Students
Amount: $500 - $1000

## Other Non-WSU Scholarship Opportunities

American Physical Society (APS) Related Scholarships (and links to other non-APS scholarships)
http://www.aps.org/programs/education/undergrad/students/scholarships.cfm

Physics and Astronomy Scholarship Opportunities (supported by Nucleus)
http://www.compadre.org/student/scholarships/browse.cfm

Society of Physics Students (SPS) Scholarships
http://www.spsnational.org/programs/scholarships/

American Association of Physics Teachers (AAPT) Scholarship for Future Teachers
http://www.aapt.org/Programs/grants/lotze.cfm

Women in Science Giving Circle Student Scholarship Awards
https://science-math.wright.edu/alumni-and-giving/women-in-science-giving-circle-student-scholarship-awards

# Life after Physics at WSU

Since 1965, over 350 people have successfully completed their BA/BS (Physics), BSEP, MS (Physics), MS (Medical Physics) and MST (Physics) studies at Wright State. The department is proud to share that graduates from our program have gone on to have distinguished and impactful careers in a variety of professions. Many of our alumni are still in the Miami Valley or other parts of Ohio. Some alumni have chosen to live and work in different parts of the United States or in other parts of the world. Graduates of the Wright State Physics program are now professors, scientists and engineers employed at national laboratories such as the Air Force Research Laboratory and Lawrence Livermore National Laboratory, and a variety of private companies. Graduates of the Wright State Physics program are also teachers or work outside of science and engineering as medical doctors and legal counsel for corporations.

## Places and Positions of WSU Physics Alumni

*Recent Graduate & Professional Programs*

- Harvard University (Applied Physics)
- University of Wisconsin (Physics)
- Cornell University (Applied Physics)
- University of Maryland (Physics)
- The Ohio State University (Physics)
- The University of Texas at Arlington (Physics)
- Michigan Technological University (Engineering Physics)
- Ohio University (Medical School)
- Case Western Reserve University (Biomedical Engineering)
- University of Cincinnati (Science Education, Aerospace Engineering)
- University of Dayton (Masters of Public Administration)
- Pennsylvania State University (Astro Physics)
- Air Force Institute of Technology (Engineering Physics)
- University of Michigan (Applied Physics)
- University of Connecticut (Physics Program)

## Professions of WSU Physics Alumni

Our alumni have gone on to become associate corporate counsel at MeadWestvaco, manager at Lockheed Martin, research leaders at Wright Patterson AFB, a physics teacher at the Dayton Regional STEM School, a teacher at Ann Arbor Public Schools, and university professors at the University of Utah and the University of Dayton, just to name a few. Others have gone on to get their Ph.D.'s and work in industry, Los Alamos National Lab, become surgeons, consultants and more!

# Life after Physics at WSU

## RESOURCES

Wright State University Career Services - http://www.wright.edu/career-services

For a list of graduate programs in physics at different universities visit - http://www.gradschoolshopper.com/

National Science Foundation (NSF) Graduate Research Fellowships - http://www.nsfgrfp.org/

Hertz Foundation Graduate Fellowships in the Applied Physical Sciences - http://www.hertzfoundation.org/

National Physical Science Consortium Graduate Fellowships in the Physical Sciences - http://www.npsc.org/

National Defense Science and Engineering Graduate (NDSEG) Fellowship Program - http://ndseg.asee.org/

The GRE Exam - http://www.ets.org/gre

The GRE Physics Exam - http://www.ets.org/gre/subject/about/content/physics

APS Physics Job Center - http://careers.aps.org/search.cfm

OSA WORKinOPTICS - http://www.workinoptics.com/

Employment at AFRL - https://afresearchlab.com/careers-and-opportunities/career-employment

# Bachelor of Science (BS) in Physics

This plan outlines a four-year path to graduation. You are expected to satisfy all "success marker" courses, grades, and GPAs as specified. For part-time students and students needing to complete background material, this schedule represents the order in which courses should be taken. This suggested plan to four-year graduation does not replace regular advising appointments. Some course offerings may change.

| **Term One** | |
|---|---|
| PHY 1000 - Undergraduate Physics Seminar I Credit Hour(s): | 1 |
| MTH 2300 - Calculus I Credit Hour(s): | 4 |
| CHM 1210 - General Chemistry I Credit Hour(s): | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **14** |
| *SUCCESS MARKERS: Can start PHY 2400 now if Calculus I already completed. Take PHY 1000 and MTH 2300 this semester.* | |
| **Term Two** | |
| PHY 1010 - Undergraduate Physics Seminar II Credit Hour(s): | 1 |
| PHY 2400 - General Physics I Credit Hour(s): | 4 |
| MTH 2310 - Calculus II Credit Hour(s): | 4 |
| CHM 1220 - General Chemistry II Credit Hour(s): | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | 15 |
| *SUCCESS MARKERS: Complete PHY 1010 and PHY 2400 by end of this year.* | |
| **Term Three** | |
| PHY 2410 - General Physics II Credit Hour(s): | 4 |
| MTH 2320 - Calculus III Credit Hour(s): | 4 |
| MTH 2530 - Elementary Linear Algebra Credit Hour(s): | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total: 18 Credit Hours** | 17 |
| *SUCCESS MARKERS: Latest PHY 2410 completion date for 4-year graduation.*<br>*Complete MTH 2320 by end of this semester.* | |
| **Term Four** | |
| PHY 2420 - Introduction to Modern Physics Credit Hour(s): 3 | 3 |
| PHY 3220 - Applied Optics Credit Hour(s): 3 | 3 |
| PHY 3710 - Analytical Mechanics Credit Hour(s): 3 | 3 |
| MTH 2330 - Differential Equations Credit Hour(s): 3 | 3 |
| CORE - Wright State Core Course *Credit Hour(s): 3* | 3 |
| **Total Credit Hours:** | 15 |
| *SUCCESS MARKERS: Complete PHY 2420 this semester.* | |
| **Term Five** | |
| PHY 3150 - Physics Instrumentation Credit Hour(s): 3 | 3 |
| PHY 3500 - Advanced Physics Laboratory I Credit Hour(s): 2 | 2 |
| PHY 4500 - Electricity and Magnetism I Credit Hour(s): 3 | 3 |
| CORE - Wright State Core Course *Credit Hour(s): 3* | 3 |
| CORE - Wright State Core Course *Credit Hour(s): 3* | 3 |
| **Total Credit Hours:** | 14 |
| *SUCCESS MARKERS: Complete MTH 2330 before PHY 4500.* | |

| Term Six | |
|---|---|
| PHY 3500 - Advanced Physics Laboratory I Credit Hour(s): | 2 |
| PHY 4510 - Electricity and Magnetism II Credit Hour(s): | 3 |
| MTH 3320 - Complex Variables Credit Hour(s): | 3 |
| GE - General Elective *Credit Hour(s):* | 3 |
| GE - General Elective *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | 14 |
| **Term Seven** | |
| PHY 4600 - Intrduction to Quantum Mechanics I Credit Hour(s): | 3 |
| PHY 4730 - Mathematical Physics Credit Hour(s): | 3 |
| PHY 4940 - Senior Project Credit Hour(s): | 3 |
| GE - General Elective *Credit Hour(s):* | 3 |
| GE - General Elective *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | 15 |
| *SUCCESS MARKERS: Complete PHY 4730 before PHY 4610. Start PHY 4940 this semester.* | |
| **Term Eight** | |
| PHY 4610 - Introduction to Quantum Mechanics II Credit Hour(s): | 3 |
| PHY 4830 - Statistical Mechanics Credit Hour(s): | 3 |
| PHY 4940 - Senior Project Credit Hour(s): | 3 |
| GE - General Elective *Credit Hour(s):* | 3 |
| **Total: 12 Credit Hours** | 12 |

| ***Note(s):*** |
|---|
| *(1) MTH 2350 can be substituted for MTH 2330.* |
| *(2) All PHY 2420 and higher courses only offered once a year.* |

# Bachelor of Arts (BA) in Physics

This plan outlines a four-year path to graduation. You are expected to satisfy all "success marker" courses, grades, and GPAs as specified. For part-time students and students needing to complete background material, this schedule represents the order in which courses should be taken. This suggested plan to four-year graduation does not replace regular advising appointments. Some course offerings may change.

| **Term One** | |
|---|---|
| MTH 2300 - Calculus I Credit Hour(s): | 4 |
| CHM 1210 - General Chemistry I Credit Hour(s): | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **13** |
| *SUCCESS MARKERS: Can start PHY 2400 now if Calculus I already completed.*<br>*Take MTH 2300 this semester.* | |
| **Term Two** | |
| PHY 2400 - General Physics I Credit Hour(s): | 4 |
| MTH 2310 - Calculus II Credit Hour(s): | 4 |
| CHM 1220 - General Chemistry II Credit Hour(s): | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | 14 |
| *SUCCESS MARKERS: Complete 2400 by end of this year.* | |
| **Term Three** | |
| PHY 2410 - General Physics II Credit Hour(s): | 4 |
| MTH 2320 - Calculus III Credit Hour(s): | 4 |
| MTH 2530 - Elementary Linear Algebra Credit Hour(s): | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **14** |
| *SUCCESS MARKERS: Latest PHY 2410 completion date for 4-year graduation.*<br>*Complete MTH 2320 by end of this semester.* | |
| **Term Four** | |
| PHY 2420 - Introduction to Modern Physics Credit Hour(s): | 3 |
| PHY 3710 - Analytical Mechanics Credit Hour(s): | 3 |
| MTH 2350 - Differential Equations with Matrix Algebra Credit Hour(s): | 4 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **16** |
| *SUCCESS MARKERS: Complete PHY 2420 this semester.* | |
| **Term Five** | |
| PHY 3150 - Physics Instrumentation Credit Hour(s): | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| CORE - Wright State Core Course *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **15** |
| **Term Six** | |
| PHY 3220 - Applied Optics Credit Hour(s): | 3 |
| GE1 - General Elective *Credit Hour(s):* | 3 |
| GE1 - General Elective *Credit Hour(s):* | 3 |

| | |
|---|---|
| GE1 - General Elective *Credit Hour(s):* | 3 |
| GE1 - General Elective *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **15** |
| **Term Seven** | |
| PHY 3500 - Advanced Physics Laboratory I Credit Hour(s): | 2 |
| PHY 4500 - Electricity and Magnetism I Credit Hour(s): | 3 |
| GE1 - General Elective *Credit Hour(s):* | 3 |
| GE2 - General Elective *Credit Hour(s):* | 3 |
| GE2 - General Elective *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **14** |
| *SUCCESS MARKERS: Complete PHY 2420 this semester.*<br>*Complete PHY 3150, PHY 3500, PHY 4500 by end of this semester.* | |
| **Term Eight** | |
| PHY *Credit Hour(s):* | 3 |
| GE2 - General Elective *Credit Hour(s):* | 3 |
| GE2 - General Elective *Credit Hour(s):* | 3 |
| GE2 - General Elective *Credit Hour(s):* | 3 |
| GE2 - General Elective *Credit Hour(s):* | 3 |
| **Total Credit Hours:** | **15** |
| **Note(s):** | |
| (1) All PHY 2420 and higher courses only offered once a year. | |
| (2) GE1: General electives. | |
| (3) GE2: General electives outside CoSM and CECS. | |

# Undergraduate Academic Programs

**Program Description**

The Department of Physics offers programs leading either to a Bachelor of Science degree or a Bachelor of Arts degree in physics. Students in secondary education may earn the Bachelor of Arts degree in physics and enter the Professional Year Experience program of the College of Education and Human Services for licensure in physics. This sheet outlines a program of study leading to a Bachelor of Science degree in physics.

The programs we offer provide a balance of experimental, hands-on experiences with theoretical and computational experiences that provide you with a strong foundation in physics. The curriculum is flexible to ensure students can pursue specific interests, such as picking up a minor in mathematics, engineering, or completing the pre-med track. Some core courses in physics include mechanics, electricity and magnetism, quantum mechanics, instrumentation, advanced lab, and optics. A host of other courses such as nanotechnology, lasers, mathematical physics, solid state physics, nuclear physics, and selected topics as well as courses from other departments can be taken are part of the general electives courses.

We have an active chapter of the Society of Physics students (www.spsnational.org). Most upper level classes range in the size from 10-20 students and provide you with an opportunity to interact closely with classmates and faculty. During your senior year, you'll work on a year-long research project with a faculty member and present your research results at the end of the year Physics Department seminar. Many students also find internships within the department or through other local and national organizations where they work on a variety of research projects. Upper level students are often hired by the department to help as teaching assistants or work in the Physics Help Room.

**Career Opportunities**

A Physics Degree prepares students for any one of a number of nearly limitless career opportunities. Nearly half of our graduates go off to graduate school in fields that include physics, engineering (electrical, biomedical, aerospace, mechanical), education, non-profit organizations, business, and medical school. Many physics graduates successfully enter and complete any graduate program that interests them! Other graduates directly enter the workforce and are employed in STEM related technical fields with both large and small companies in the Dayton area and nationally. These positions are typically engineering, software (programming) and applied research positions. The power of the Physics Degree is the solid core in mathematics and physics (theoretical and experimental skills) that provides you with a foundation for any one of a number of career opportunities. This solid foundation allows you to adapt and excel in nearly any emerging scientific and technical field in an ever changing and increasingly complex world.

**Additional Comments**

Other courses: PHY4400 Nanotechnology, PHY4730 Mathematical Physics, PHY4320 Lasers, PHY 3300 Astrophysics, PHY4630 Solid State Physics, PHY4700 Selected Topics (topics vary but have included Microfabrication Science, Medical Physics and Computational Physics .

Externals web links with additional information: American Institute of Physics (AIP): www.aip.org
Employment statistics: www.aip.org/statistics/trends/reports/empinibs0910.pdf
www.aip.org/statistics/trends/emptrends.html
Check out how well physics majors do on the MCAT for medical school and the LSAT for law school:
http://www.aip.org/statistics/trends/reports/mcat2009.pdf

| Physics Course Cheat Sheet (non-electives) | | | |
|---|---|---|---|
| **Course** | **Title** | **Pre-Reqs** | **Typicaly Offered** |
| 1000 | Undergraduate Physics Seminar I | None | Fall |
| 1010 | Undergraduate Physics Seminar II | PHY 1000 | Spring |
| 2400 | General Physics I | MTH 2300 | Fall, Spring, Summer |
| 2410 | General Physics II | PHY 2400, MTH 2310 | Fall, Spring, Summer |
| 2420 | Introduction to Modern Physics | PHY 2410 | Fall |
| 3150 | Physics Instrumentation | PHY 2410 | Fall |
| 3220 | Applied Optics | PHY 2410 | Spring |
| 3710 | Analytical Mechanics | PHY 2410, MTH 2330 or MTH 2350 | Spring |
| 3500 | Advanced Physics Laboratory I | PHY 2420, PHY 3150 | Fall |
| 3510 | Advanced Physics Laboratory II | PHY 3500 | Spring |
| 4500 | Electricity and Magnetism I | PHY 2410, MTH 2320, MTH 2330 or 2350 | Fall |
| 4510 | Electricity and Magnetism II | PHY 4500 | Spring |
| 4600 | Introduction to Quantum Mechanics I | PHY 2420, MTH 3330 | Fall |
| 4610 | Introduction to Quantum Mechanics II | PHY 4600 | Spring |
| 4830 | Statistical Mechanics | | Spring |
| 4940 | Senior Project | PHY 3510 | |
| | | | |

| Math Course Cheat Sheet | | | |
|---|---|---|---|
| 2300 | Calculus I | Math placement = 50 or MTH 1350 | Fall, Spring, Summer |
| 2310 | Calculus II | MTH 2300 | Fall, Spring, Summer |
| 2320 | Calculus III | MTH 2310 | Fall, Spring, Summer |
| 2330 | Differential Equations | MTH 2310 | Fall, Spring, Summer |
| 2350 | Differential Equations with Matrix Algebra | MTH 2310 | Fall, Spring, Summer |
| 2530 | Linear Algebra | MTH 2300 | Fall, Spring, Summer |
| 3330 | Partial Diffrential Equations | MTH 2320, MTH 2330 or MTH 2350 | Spring |
| 3320 | Comples Variables | MTH 2320 | Fall |
| | | | |

# CORE PROGRAM REQUIREMENTS

| Elements | Required Distribution | Hours |
|---|---|---|
| Communication | One first-year composition course<br>One second-year writing course | 6 |
| Mathematics | One course | 3 |
| Global Traditions | One interdisciplinary Global Studies course<br>One history course | 6 |
| Arts/Humanities | One course | 3 |
| Social Science | Two courses from different disciplines | 6 |
| Natural Science | Two lecture/lab science courses | 8 |
| Additional Core Courses | Two additional approved WSU Core course from any of the Elements (some programs may designate these courses) | 6 |
| Multicultural Competence | As a part of the Core, in addition to the interdisciplinary Global Studies Course (Element 3), students must take a scond designated multicultural competence class in the Element or as and additional course. | n/a |
| Writing Across the Curriculum | As a part of the Core, students must take two Integrated Writing (IW) Core Course | n/a |
| **Total** | **12 Courses** | **38** |

# CORE COURSES

| | | | | |
|---|---|---|---|---|
| **Element 1 - Communication: First Year Writing Course** | | | | |
| | ENG 1100 | Academic Writing and Reading | | |
| | ENG 1110 | Academic Writing and Reading- Repeat | | |
| | ENG 1130 | Academic Writing and Reading | | |
| | ENG 1140 | Intensive Academic Writing and Reading | | |
| **Element 1 - Communication: Second Yeaer Writing Course** | | | | |
| | EGR 3350 | Technical Communications for Engineers and Scientist | | |
| | ENG 2100 | Research Writing and Argumentation | | |
| | ENG 2110 | Research Writing and Argumentation: Education | | |
| | ENG 2120 | Research Writing and Argumentation: Health Sciences | | |
| | ENG 2130 | Research Writing and Argumentation: Sciences | | |
| | ENG 2140 | Research, Technical Writing, and Presentation for Scientist and | | |
| **Element 2 - Mathematics** | | | | |
| | EC 1050 | Elementary Mathematical Economics and Business Models and | | |
| | EGR 1010 | Introductory Mathematics for Engineering Applications (IW) | | |
| | MTH 1440 | Mathematics and Modern World and Algebra Review | | |
| | MTH 1450 | Mathematics and Modern World | | |
| | MTH 2240 | Applied Calculus | | |
| | MTH 2280 | Business Calculus | | |
| | MTH 2300 | Calculus I | | |
| | MTH 2310 | Calculus II | | |
| | MTH 2430 | Mathematics Concepts for Teachers II | | |
| | STT 1600 | Statistical Concepts | | |
| | STT 2640 | Elementary Statistics | | |

| | | | | |
|---|---|---|---|---|
| **Element 3 - Global Traditions: Interdisciplinary Global Studies** | | | | |
| | AFS 2000 | What is African and African American Experience? (IW,MC) | | |
| | ART 2430 | Nonwestern Art (IW,MC) | | |
| | ATH 2150 | Comparative Nonwestern Cultures (IW,MC) | | |
| | ATH 2500 | Introduction to Cultural Anthropology for Health Care | | |
| | CS 1000 | Technology and Society (MC) | | |
| | EC 2100 | The Economics of State and Society | | |
| | EC 2500 | Economic Systems of the Global South (IW,MC) | | |
| | EC 2900 | Global Economic, Business and Social Issues (IW,MC) | | |
| | ED 2100 | Education in a Democracy (MC) | | |
| | ED 2600 | Introduction to Education (IW,MC) | | |
| | ED 2800 | Cultural Humility for Working with Youth (IW,MC) | | |
| | EDS 2900 | Individuals and Exceptionalities (IW, MC) | | |
| | EES 2600 | Environmental Science & Society: A Cross Cultural Perspective (MC) | | |
| | ENG 2310 | Comparative Literature: Non-Western Literatures (IW,MC) | | |
| | ENG 2320 | American Academics Culture (MC) (RESTRICTED TO | | |
| | FAS 1050 | Amish Society | | |
| | GEO 2210 | Non-Western Human Environments (IW,MC) | | |
| | ML 2020 | Chinese Culture Through Film (MC) | | |
| | ML 2030 | Spanish Culture (MC) | | |
| | ML 2040 | The Hispanic World: Cultures in Motion (MC) | | |
| | ML 2050 | Russian Culture (MC) | | |
| | MUS 2420 | Comparative Nonwestern Cultures: Music (IW,MC) | | |
| | PPH 2000 | Global Health (IW,MC) | | |
| | PLS 2510 | Comparative Nonwestern Social Systems (IW,MC) | | |
| | REL 2320 | Nonwestern Religions (IW,MC) | | |
| | RST 2610 | Regional Studies: Japan (IW,MC) | | |
| | RST 2620 | Regional Studies: China (IW,MC) | | |
| | RST 2710 | Regional Studies: Africa (IW,MC) | | |
| | RST 2810 | Regional Studies: Latin America (IW,MC) | | |
| | RST 2910 | Regional Studies: Middle East (IW,MC) | | |
| | RST 2920 | Regional Studies: India (IW,MC) | | |
| | URS 2000 | Growth and Change in Urban Society (IW,MC) | | |
| **Element 3 - Global Traditions: History** | | | | |
| | CLS 1500 | Introduction to Greek and Roman Culture | | |
| | HST 1100 | Western Civilizations to 1500 | | |
| | HST 1200 | The West and World since 1500 | | |
| **Element 4 - Arts/Humanities** | | | | |
| | ART 2140 | Themes in Visual Culture | | |
| | CLS 1600 | Introduction to Classical Mythology | | |
| | CLS 2040 | Great Books - Classsics (IW) | | |
| | ENG 2040 | Great Books - Literature (IW) | | |
| | ENG 2050 | African-American Literature (IW,MC) | | |
| | ENG 2310 | Comparative Literature: Non-Western Literatures (IW,MC) | | |
| | FMS 1310 | Introduction to Film Studies | | |
| | ML 2020 | Chinese Culture Through Film (MC) | | |

| Element 4 - Arts/Humanities(cont'd) | | | | |
|---|---|---|---|---|
| | ML 2040 | The Hispanic World: Cultures in Motion (MC) | | |
| | ML 2050 | Russian Culture (MC) | | |
| | MP 1310 | The Moving Image | | |
| | MUS 1210 | Music Learning | | |
| | MUS 2140 | Music in Western Culture | | |
| | MUS 2420 | Comparative Nonwestern Cultures: Music (IW,MC) | | |
| | MUS 2900 | African-American Music: America and Beyond (IW,MC) | | |
| | PHL 2040 | Great Books: Philosophy (IW) | | |
| | PHL 2050 | Philosophy: The Big Question (IW) | | |
| | PHL 2100 | Philosophy of State and Society | | |
| | REL 2040 | Bible, Qur'an and Western Culture (IW,MC) | | |
| | TH 2140 | Theatre in Western Culture | | |
| | UH 2010 | Studies in Humanities (IW) | | |
| **Element 5 - Social Science** | | | | |
| | ATH 2200 | Introduction to Archaelogy | | |
| | EC 2000 | Economic Life (IW) | | |
| | EC 2040 | Principles of Microeconomics | | |
| | EC 2050 | Principles of Macroeconomics | | |
| | EC 2100 | The Economics of State and Society | | |
| | EC 2500 | Economic Systems of the Global South (IW,MC) | | |
| | EC 2900 | Global Economic, Business and Social Issues (IW,MC) | | |
| | ED 2600 | Introduction to Education (IW,MC) | | |
| | ED 2700 | Introduction to Educational Psychology (IW) | | |
| | EDS 2900 | Individuals and Exceptionalities (IW, MC) | | |
| | FIN 2050 | Personal Financial Decision Making | | |
| | PLS 2000 | Power and Politics | | |
| | PLS 2120 | American National Government (MC) | | |
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| *KEY TO COURSE CODES* |
|---|
| ***IW - Integrated Writing*** |
| ***MC- Multicultural Competence*** |

# WSU Physics Faculty Research

## Biophysics

### B. Foy - modeling of biological processes

Dr. Foy joined Wright State in 1994 after a PhD in Medical Physics at MIT. His research interests include: developing biologically-based kinetic models of toxin disposition; performing bioinformatic support and modeling for genomics/ proteomics/metabolomics studies; studying diffusion of proteins in cartilage as a possible sensitive indicator of early arthritic decay; using 13C NMR and mathematical models of biochemical reaction pathways to estimate metabolic fluxes. Dr. Foy is currently Director of the Medical Physics program.

### T. Skinner - computational physics

Dr. Skinner obtained his PhD in Physics, applying ultraviolet spectroscopy to the study of the outer planets. He began his professional career at the University of Colorado's Laboratory for Atmospheric and Space Physics as a member of the ultraviolet spectroscopy team for the Galileo mission to Jupiter (1985-1988). After the space shuttle Challenger accident delayed the Galileo mission for 10 years, he expanded his research into the field of nuclear magnetic resonance (NMR) spectroscopy. He joined the Wright State Physics Department in 1993 and has currently received over $1.4M in funding from NSF, NASA, and NIH. His primary research is the development of advanced NMR and EPR methods for spectroscopy and imaging, with a focus on applications of optimal control theory. He has also received funding for applying percolation theory to groundwater transport, as well as funding for continued research in planetary atmospheres. He has over 50 peer-reviewed articles to date, with an h-index of 16.

# WSU Physics Faculty Research

## Chemical Physics

### J. Fox (research faculty) - AGU Fellow - physics and chemistry of ionospheres and thermospheres of earth and planets

Dr. Fox received her PhD in chemical physics. She joined Wright State in 1995 after appointments at various other institutions. She was an Associate Editor of the Journal of Geophysical Research from 1989 to 1992. She researches chemical physics processes in the atmospheres of Mars and Venus (e.g., the chemistry of minor ions and neutrals, airglow and auroras, heating, atmospheric evolution), work primarily funded by NASA. Dr. Fox is a research professor. She was elected a fellow of the American Geophysical Union in 2005.

### I. Medvedev - molecular spectroscopy, terahertz imaging, chemical sensing

Dr. Medvelev joined Wright State in 2010. His PhD thesis included the theoretical analysis of the rotational spectra of molecules of astrophysical interest. His research interests lie in the area of experimental atomic and molecular optical physics, with primary focus being the study of high resolution molecular ro-vibrational spectroscopy and its analytical applications. Currently, Dr. Medvedev is working on the development of analytical THz sensors in application to environmental and occupational chemical sensing and intelligence. He has over 30 peer-reviewed articles to date.

### A. Sharma - applied theoretical/computational electronic structure methods

Dr. Sharma's current research is in the field of applied theoretical/computational electronic structure methods with focus on developing fundamental understanding, investigation of thermochemistry, study of dynamics and kinetics of chemical reactions which are important to understanding combustion. He has also contributed significantly to computational spectroscopy of the gas-phase molecular species. His PhD research focused on developing multi-scale model and atomistic modeling of chemical processes in materials and modeled the build-up of amorphous hydrocarbon layers in the fusion devices and studied the diffusion of hydrogen in graphite using ab initio molecular dynamics in condensed phase.

# WSU Physics Faculty Research

## Geophysics

### A. Hunt - electrical properties of random media; percolation theory

Dr. Hunt received his PhD in Condensed Matter Theory and was a Fulbright Fellow at Philipps Universität Marburg, 1985-1987. He was Hydrologic Sciences program director at NSF 2002-2003 and has been visiting faculty and scientist at a number of institutions before joining Wright State in 2004. His current research focuses on transport in porous media. He has given numerous invited talks on that subject at international conferences and recently wrote Percolation Theory for Flow in Porous Media, 2nd ed. (2009) by Springer Verlag. Dr. Hunt has a joint appointment with the Department of Earth & Environmental Sciences.

### S. Tebbens - scaling phenomena

Dr. Tebbens has a PhD in Marine Geology and Geophysics. She was a tenured faculty at the University of South Florida before joining Wright State in 2004. Her research involves the nonlinear analysis and modeling of geophysical processes including coastal changes, tsunamis, forest fires, seismology and environmental hazards. Dr. Tebbens has received over $1M in external funding over the years.

## Physics Education

### B. Basista - K-12 physics education

Dr. Basista is a physics educator and a STEM Center Fellow. Her PhD was in particle physics but her research now focuses on improving teacher quality at the K-12 level. She has received over $6M in external funding as PI or co-PI. She is Director of the WeEXCEL center in science education at WSU; the center is funded, in part, by the Ohio Board of Regents. Dr. Basista joined Wright State in 1995 and works with the Department of Teacher Education.

### A. Traxler - Physics education research

Dr. Traxler received her Ph.D. in Applied Mathematics & Statistics from the University of California Santa Cruz, 2011, a M.S. in Teaching from the University of Maine, 2006, and a B.S. in Physics from the University of Maine, 2004. Her research interests include problem-solving, student attitudes and epistemologies, diversity and equity issues in physics education. She joined WSU in 2014.

### E. Rowley - K-12 physics education

Dr. Rowley has a PhD in Science Education with an emphasis in Physics. As a licensed high-school physics teacher, he brings teaching experience to our physics courses for pre-service teachers. His current research interests include use of the Investigative Science Learning Environment in the classroom. He joined Wright State as an Instructor in 2009 and became a Lecturer in 2012.

# WSU Physics Faculty Research

## Solid State Physics/Materials Science

### E. Brown - APS Fellow, IEEE Fellow - solid state electronics

Dr. Brown has worked at the Hughes Aircraft Co. and MIT Lincoln Laboratory, and was a program manager for DARPA. Before joining WSU in 2010, he was an EE faculty at UCLA and an ECE professor at UCSB. Dr. Brown is a Fellow of the IEEE and of the American Physical Society. In 1998, he received an Award for Outstanding Achievement from the U.S. Office of the Secretary of Defense. He is the Ohio Research Scholar in Layered Sensing at Wright State and holds a joint appointment with EE. His research includes terahertz solid state electronic devices. Research in solid-state sensor devices involves all aspects of device analysis and design including the basic solid-state physics, optimal sensor geometry and coupling (electromagnetic, thermal, acoustic, etc), noise mechanisms, and readout electronics.

### J. Clark - optical characterization of solids, quantum electronics

Dr. Clark has been at Wright State since 1984. His research interests include atomic, molecular and optical physics, plasma physics, and quantum electronics. He has recently developed a cathodoluminescence and a photoreflectance set up for studying quantum dots. Dr. Clark has received a number of external contracts in support of his research and an NSF ILI grant in support of his teaching.

### J. Deibel - terahertz & ultrafast spectroscopy

Dr. Deibel got his PhD in applied physics working on ultrafast spectroscopy. He joined Wright State in 2007. His current research focuses on the design and application of terahertz (THz) systems, including the finite-element simulation of THz waveguides and metamaterials, and the THz characterization of carbon nanotubes. He has received over $4M in external funding. He has Dissertation Qualified Faculty status in the College of Engineering and Computer Science.

### G. Kozlowski - High temperature superconductivity, magnetic properties of materials, metallic nanoparticles.

Dr. Kozlowski joined Wright State in 1999 after 10 years working in the Materials Directorate at the Air Force Research Lab, Wright-Patterson AFB. His research interests include materials science, magnetism and superconductivity. He has published over 100 papers and has been awarded a couple of patents. Dr. Kozlowski has a PhD from the Polish Academy of Sciences and a DSc from Wroclaw University. He has Dissertation Qualified Faculty status in the College of Engineering and Computer Science.

# WSU Physics Undergraduate Courses

7 hours under this particular requirements.

| | |
|---|---|
| **PHY1000 Undergraduate Physics Seminar I**<br>(Credits: 1)<br>Provides undergraduate physics majors with an introduction to the course load, faculty, resources, and expectations associated with the Wright State University undergraduate physics program. | **PHY1010 Undergraduate Physics Seminar II**<br>(Credits: 1)<br>Provides undergraduate physics majors with an introduction to the course load, faculty, resources, and expectations associated with the Wright State University undergraduate physics program. Continuation of PHY 1000. |
| **PHY1050 Physics of How Things Work**<br>(Credits: 3)<br>The physics associated with everyday scientific and technological phenomena and devices, including those associated with the generation, detection, and application of sound, light, and energy. | **PHY1060 Astronomy**<br>(Credits: 3)<br>Introduction to astronomy emphasizing the solar system and the universe of stars and galaxies. Topics include the earth-moon system, other planets and their satellites, space exploration, theories for the origin of the solar system stellar evolution, astrophysics, and cosmology. |
| **PHY1110 Principles of Physics I**<br>(Credits: 4)<br>Fundamental physics of mechanics. Topics include laws of motion, work and energy, momentum, circular and rotational motion, gravity, fluids, mechanical waves and thermodynamics<br>Prerequisite: MTH 1280 or WMTH for min. score of 05 | **PHY1120 Principles of Physics II**<br>(Credits: 4)<br>Fundamentals of charge, electric field, magnetism, optics and modern physics. Topics include electric and magnetic fields, electromagnetic induction, electromagnetic waves, geometric and wave optics, optical instruments, relativity, quantum theory, and nuclear physics.<br>Prerequisite: PHY 1110 |
| **PHY2400 General Physics I**<br>(Credits: 4)<br>Introductory survey of mechanics for science and engineering students. Uses of in interpreting physical phenomena. Topics include vectors, kinematics, dynamics, energy, momentum, rotation, oscillation and thermodynamics.<br>Prerequisite: MTH 2300 (may be taken concurrent) or EGR 1010 (may be taken concurrent) | **PHY2410 General Physics II**<br>(Credits: 4)<br>Introductory survey of electricity and magnetism. Uses calculus in interpreting physical phenomena. Topics include electric field and potential, currents, DC circuits, magnetic fields, Faraday's law, and optics.<br>Prerequisite: PHY 2400 and MTH 2300 and MTH 2310 (may be taken concurrent) |
| **PHY2420 Introduction to Modern Physics (**Credits: 3)<br>Phenomenology and theoretical concepts of modern physics. Special theory of relativity, quantum theory, atomic and molecular structure and spectra, x-rays and solid state physics, nuclear physics, and instrumentation for nuclear physics research.<br>Prerequisite: PHY 2410 and MTH 2310 | **PHY2450 Concepts in Physics for Early Childhood Education** (Credits: 3.5)<br>Fundamental concepts and applications of physics designed for early childhood education majors. Topics are integrated with mathematics and include laboratory experiences, demonstrations, and projects. Students may use either PHY 2450 or PHY 2460, but not both courses, to satisfy the requirements of the WSU Core.<br>Prerequisite: WMTH for min. score of 04 or MTH 1260 |

# WSU Physics Undergraduate Courses (cont.)

| | |
|---|---|
| **PHY2460 Concepts in Physics for Middle Childhood Education**<br>**(**Credits: 3.5)<br>Fundamental concepts and applications of physics designed for middle childhood education majors. Topics are integrated with mathematics and include laboratory experiences, demonstrations, and projects. Students may use either PHY 2450 or PHY 2460, but not both courses, to satisfy the requirements of the WSU Core.<br>Prerequisite: WMTH for min. score of 04 or MTH 1260 | **PHY3150 Physics Instrumentation**<br>(Credits: 3)<br>Analog and digital electronics with an emphasis on use in the laboratory. Topics include linear devices and analysis, op-amps, the use of digital components including logic gates, counters, microcontrollers, and ADC/DAC.<br>Prerequisite: PHY 2410 |
| **PHY3220 Applied Optics**<br>(Credits: 3)<br>Physical optics, with some review of geometrical optics. Topics include optical instrumentation, interference of light, optical interferometry, diffraction, fiber optics, lasers and nonlinear optics.<br>Prerequisite: PHY 2410 | **PHY3460 Concepts and Applications in Physics II**<br>(Credits: 4)<br>Basic concepts and applications in physics including electricity, magnetism, optics, waves, simple machines. Inquiry learning environment emphasizing science process and mathematical reasoning, problem-solving, technology and societal connections.<br>Prerequisite: MTH 2430 and MTH 2450 and PHY 2460 |
| **PHY3500 Advanced Physics Laboratory I** (Credits: 2)<br>Statistical analysis of experimental data. Emphasizes experimental design, data analysis, and presentation in report form. Experiments are taken from several major areas of physics, such as optics, spectroscopy, solid state physics, acoustics, nuclear physics and electronics. Integrated Writing course.<br>Prerequisite: PHY 2420 and PHY 3150 | **PHY3510 Advanced Physics Laboratory II**<br>(Credits: 2)<br>Statistical analysis of experimental data. Emphasizes experimental design, data analysis, and presentation in report form. Experiments are taken from several major areas of physics, such as optics, spectroscopy, solid state physics, acoustics, nuclear physics and electronics. Integrated Writing course.<br>Prerequisite: PHY 2420 and PHY 3150 |
| **PHY3710 Analytical Mechanics**<br>(Credits: 3)<br>Problems in the dynamics of motion in 1, 2 and 3 dimensions. Mathematical and computational approaches are applied to systems with non-constant forces, central forces, and oscillations.<br>Prerequisite: PHY 2410 and MTH 2350 | **PHY4270 Physics of Remote Sensing**<br>(Credits: 3)<br>Purpose and motivation for remote sensing, spectral temporal, spatial, and radiometric characteristics and resolution issues, propagation of electromagnetic energy, optics, atmospheric effects, image collection and quality, sensor performance measures, platforms and orbits |

# WSU Physics Undergraduate Courses (cont.)

| | |
|---|---|
| **PHY4320 Lasers**<br>(Credits: 3)<br>Introduction to the physics of lasers including emission and absorption processes in lasing, the factors controlling laser gain, the properties of optical resonators, and a survey of salient features for principal types of lasers.<br>Prerequisite: PHY 2420 | **PHY4450 Teaching Physical Science**<br>(Credits: 3)<br>Pedagogical content knowledge and skills necessary to teach physical science. Includes an analysis of the high school physics curriculum and detailed development of teaching strategies for most physical science topics.<br>Prerequisite: PHY 2410 |
| **PHY4460 Multiple Representations in Physical Science**<br>(Credits: 3)<br>Acquaints physics teachers with the multiple representation method used in constructing concepts and problem solving in physical science. Focus will be placed on representations including pictorial representations, motion and force diagrams, graphs, energy bar charts, ray and wave front diagrams, and use of analogies.<br>Prerequisite: PHY 2420 | **PHY4470 Development of Ideas in Physical Science**<br>(Credits: 3)<br>Acquaints physics and chemistry teachers with the construction of knowledge in physical science and its implications to science instruction. Focuses on the processes that lead to the laws of physics and chemistry and how this knowledge of science history can be used to design physics and chemistry lessons.<br>Prerequisite: PHY 2420 |
| **PHY4500 Electricity and Magnetism I**<br>(Credits: 3)<br>Fundamental laws of electricity and magnetism from viewpoint of fields. Review of vector analysis; electrostatics; special techniques in electrostatics; magnetostatics; and material properties.<br>Prerequisite: PHY 2410 and (MTH 2330 or MTH 2350) | **PHY4510 Electricity and Magnetism II**<br>(Credits: 3)<br>Fundamental laws of electricity and magnetism from viewpoint of fields. Electromagnetic waves; time dependent potentials and fields; radiation; resonant cavities; waveguides and transmission lines.<br>Prerequisite: PHY 4500 |
| **PHY4560 Integrating Phy Sci & Math II**<br>(Credits: 4)<br>Integration of physics and mathematics, fulfilling science and math standards, physics education issues, inquiry teaching practices, and assessment. Applications of these to electricity, magnetism, waves, and optics. | **PHY4400 Introduction to nanoscience and technology** (Credits: 3)<br>Topics include introduction to quantum mechanics, fabrication, characterization, materials, electronic properties, optical properties, magnetic properties, devices, MEMS and NEMS. Prerequisite: PHY 2410 |
| **PHY4600 Introduction to Quantum Mechanics I**<br>(Credits: 3)<br>Mathematical structure of quantum mechanics. Applications to selected one- and three-dimensional problems with emphasis on atomic structure.<br>Prerequisite: PHY 2420 and MTH 3330 | **PHY4610 Introduction to Quantum Mechanics II**<br>(Credits: 3)<br>Introduction to the theoretical foundations of quantum theory. The Schrodinger and Heisenberg formulations of the harmonic oscillator, the hydrogen atom, the theory of quantized angular momentum, and scattering. Hilbert space, operators, commutation relations, and the Heisenberg uncertainty principle are included.<br>Prerequisite: PHY 4600 |

# WSU Physics Undergraduate Courses (cont.)

| | |
|---|---|
| **PHY4620 Nuclear and Particle Physics**<br>(Credits: 3)<br>Nuclear properties and models, radioactive decay, nuclear applications, elementary particle properties and interactions, the standard model.<br>Prerequisite: PHY 4600 | **PHY4630 Introduction to Solid State Physics**<br>(Credits: 3)<br>Selected properties of solids and their quantitative explanation in terms of simple physical models. Applications of quantum mechanics to solids.<br>Prerequisite: PHY 2420 |
| **PHY4700 Selected Topics in Physics**<br>(Credits: 1 to 3)<br>Selected topics in physics.<br>Prerequisite: PHY 3710 | **PHY4730 Mathematical Physics**<br>(Credits: 3)<br>Survey of mathematical physics, including vector analysis, analytical mechanics, electromagnetism, and thermodynamics. |
| **PHY4800 Classical Mechanics**<br>(Credits: 3)<br>Introduction to classical theoretical physics. Emphasis on mechanics and mathematical techniques.<br>Prerequisite: PHY 3710 and PHY 4510 | **PHY4830 Statistical Mechanics**<br>(Credits: 3)<br>Introduction to microscopic and macroscopic physical systems developed from concepts of statistical physics. Applications to classical and quantum systems. Theories of phase transitions, critical phenomena and fluctuations. |
| **PHY4940 Senior Project**<br>(Credits: 3)<br>Selected problems in experimental and theoretical physics with critical analysis of results. Integrated Writing course. | **PHY 4400 Intro. To Nanoscience & Nanotechnology** (Credits: 3)<br>Introduction to nanoscience and technology. Topics include introduction to quantum mechanics, fabrication, characterization, materials, electronic properties, optical properties, magnetic properties, devices, MEMS and NEMS. |
| Coming soon:<br>3000 Level Astrophysics | Coming soon:<br>4000 Level Clean Room Course |

# PHY 4940 – Senior Project

# Syllabus and Guidelines

**Course Description:**

This is a year-long capstone course in the physics program. Students must synthesize and apply conceptual understanding and practical knowledge gained from coursework to complete an extensive design/ development/research project similar to one they might encounter as a working professional. Because the senior project is intended to be a capstone experience for our majors, it is generally recommended that the student not begin their senior project before the summer preceding their senior year. It is also important for the student to evaluate if they have a sufficient background and/or experience for their proposed projects, especially whether the requisite upper-division courses have been completed or will be completed in time to benefit the student. This course sequence is also expected to span two semesters at 3 credit hours of research work per term. *A student may apply to complete the entirety of their senior project in one semester, but this will be treated as an extreme exception that will require a clear demonstration of unique circumstances that requires approval of the Department Chair, the Chair of the Undergraduate Studies Committee, the Senior Project Supervisor, and the Senior Project Research Advisor. Approval of such requests will be rare and will only be granted if necessary.*

The PHY 4940 Senior Thesis project provides an opportunity for students to complete a 2-semester long research project under the supervision of a faculty member of the Physics Department. Senior projects may be supervised by someone who is not a member of the Physics Department if a physics faculty member serves as a **participating** co-advisor.

Prior to the start of their last two semesters at Wright State University, students meet with faculty to select a Senior Project Research Advisor (SPRA) and begin to develop a plan for the senior project. Prior to the start of classes, the SPRA and the student should complete a draft of the senior project application (attached) that includes a short description of the project. The Chair of the Undergraduate Studies Committee and the Senior Project Advisor must approve all PHY 4940 senior project applications.

All PHY 4940 sections have two instructors. The primary instructor for all projects is the Senior Project Advisor (SPA). The SPA is a faculty member who supervises the course for all participating students, assist with project advising as needed, and helps to ensure project quality and rigor. The SPA will meet with all PHY 4940 students on a regular basis and provide milestone assignments to monitor and encourage progress. Other assignments will help students with career planning. The second instructor for each PHY 4940 section will be the SPRA. All grades will be determined by the Senior Project Advisor, with the including these exceptions (The complete detailed list can be found on page 4):

- Mid-Project Report – Prior to the end of the first semester of PHY 4940, students will submit a progress report, summarizing the work completed to date on their project. Both the SPA and the SPRA will independently grade the reports. The assigned grade will be an average of the two.
- Final Written Report – Students must complete a minimum 4 page report summarizing their senior project in the format of an academic journal which has been selected by the project research advisor. Both the SPA and the SPRA will independently grade the reports. The assigned grade will be an average of the two.
- Oral Presentation – All students will present their work to the department near the end of the second semester of PHY 4940. The SPA and the SPRA will independently grade the reports, and the assigned grade will be an average of the two.

**Learning Outcomes:**

Students who are successful in this course will have proven their ability to

a) Identify a problem that they have the ability to solve.
b) Use their scientific reasoning skills developed in prior course work to solve said problem.
c) Analyze the results of a problem.
d) Report the results their work via both oral presentation and written report.

Accomplishment of these outcomes will require a literature search, laboratory and/or computer work, analysis and interpretation of results, progress reports, an extensive written final report, and a seminar presentation.

**Integrated Writing**

PHY 4940 is designated as an Integrated Writing Course (IW). Wright State students will be able to produce writing that:

- Demonstrates their understanding of course content,
- Is appropriate for the audience and purpose of a particular writing task,
- Demonstrates the degree of mastery of disciplinary writing conventions appropriate to the course (including documentation conventions), and
- Shows competency in standard edited American English.

This course meets the following requirements:

- The course syllabus identifies the course as an IW course.
- The IW learning outcomes are listed on the syllabus.
- A significant amount of writing is required: a minimum total of 2,000 words in IW Wright State Core courses and a minimum total of 5,000 words in IW courses in the major.
- Students will receive response to their writing and have opportunities to use that response to improve their writing.
- Writing assignments are integrated into the course design. Students should not be able to pass the course without completing the writing assignments.
- Criteria for evaluating writing are clearly articulated and provided to students.

**PHY 4940 STUDENT Expectations**

1. Identify a Senior Project Research Advisor and complete the PHY 4940 Senior Project application prior to the start of the first semester of PHY 4940.
2. Conduct a minimum of 10 hours of work on their projects weekly during both terms. It is a clear and stated expectation of the Senior Project that students perform research work regularly and consistently during both terms. Students who attempt to delay their work until the latter part of the 2nd term of 4940 will receive substantially lower grades and risk ultimately failing the course and jeopardizing their graduation.
3. Meet regularly with their Senior Project Research Advisor (weekly is recommended).
4. Attend all PHY 4940 meetings as called by the Senior Project Advisor. Attendance at these meetings is required and failure to attend will affect the final PHY 4940 grade.
5. Chronicle all aspects of the senior project in a formal lab notebook including progress, meetings, planning, data taking, analysis, etc.
6. Complete all PHY 4940 project assignments and milestones on schedule. Failure to do so will affect the final PHY 4940 grade.
7. Understand that the Senior Project is a serious endeavor and that failure to demonstrate both sufficient work and progress may impact their ability to graduate on schedule.

## PHY 4940 SENIOR PROJECT RESEARCH ADVISOR (SPRA) Expectations

1. SPRA's will develop, in collaboration with the physics student, a Senior Project with physics content and rigor appropriate for a student who has completed the majority of the undergraduate physics curriculum.
2. SPRA's will meet regularly with their senior project students.
3. SPRA's will work with their students to develop comprehensive goals, objectives, and timelines for their project.
4. SPRA's will monitor student progress and completion of all related senior project assignments and tasks.
5. SPRA's will provide, in a timely manner, assessment of the items that they are responsible for grading.
6. If the project will involve working with a graduate student or post-doc, the SPRA will follow all of the above guidelines as well as take steps to insure that the graduate student and/or post-doc are interacting with the senior project student in a manner that insures the quality and experience of the project.

### Course Grading

A: 90-100%, B: 75-89.9%, C: 60-74.9%, D: 50-59.9%, F: < 50%

Grades will be assigned based on something similar to the following breakdown:

| **PHY 4940 - 1st Semester** | | **PHY 4940 - 2nd Semester** | |
|---|---|---|---|
| Senior Project Meeting Attendance | 5% | Senior Project Meeting Attendance | 5% |
| Milestone Assignments | 25% | Milestone Assignments | 20% |
| Research Notebook* | 15% | Research Notebook* | 15% |
| Mid-term Progress Report* | 25% | Mid-term Progress Report* | 15% |
| Final Semester Report* | 30% | Final Semester Report* | 20% |
| Oral Presentation* | 25% | | |
| ** Items to be graded by both the SPA and SPRA.* | | | |

***All deliverables will be uploaded to the PHY 4940 Pilot page. Materials accumulated over the course of the two semester sequence will form a senior project portfolio.***

## PHY 4940 Senior Project Milestones and Deliverables (Semester 1)

| Week | Course Component | Description | Graded by |
|---|---|---|---|
| **1** | A. Orientation<br>B. Draft Senior Project Application | **Milestone:** Turn in draft of senior project application, to be returned with feedback if any changes are necessary. | **SPA** |
| **2/3** | Finalized Senior Project Application | **Milestone:** Turn in final senior project application and signed student/SPRA contract. | **SPA/ SPRA** |
| **3** | Career Development Plan | **Milestone:** One-page summary of "in one year…" goals and what steps are needed to get there. | **SPA** |
| **4** | Goals, Objectives, & Timeline | **Milestone:** Deadline to complete project information and logistics questionnaire. | **SPA** |
| **5** | Check-in | **Milestone** | **SPA** |
| **6** | Literature Search | **Milestone** | **SPA** |
| **7** | Mid-term Progress Report | **Milestone:** Turn in 2-page mid-term progress report. | **SPA** |
| **8** | Notebook Check | | **SPA/ SPRA** |
| **9** | Research Methodology Description | **Milestone:** Turn in one-page description of data collection and analysis procedures (spanning completed work and plans). | **SPA** |
| **10** | Check-in | **Milestone:** Choose a reference manager and use it to export three project-relevant citations in an appropriate journal style. | **SPA** |
| **11** | Career Development Plan Part 2 | **Milestone** | **SPA** |
| **12** | Draft Semester Report | **Milestone:** Turn in first draft of semester project report for comments. | **SPA** |
| **13** | | | |
| **14** | **Final Semester Report** | | **SPA/ SPRA** |
| **Finals Week** | **Semester final report is due no later than noon on Wednesday of finals week.** | | |

**PHY 4940 Senior Project Milestones and Deliverables (Semester 2)**

| Week | Course Component | Description | Graded by |
|---|---|---|---|
| **1** | Check-in | **Milestone** | **SPA** |
| **2** | 2nd Term Goals, Objectives, & Timeline | **Milestone:** Reflection (0.5-1 page) on work habits from first semester of 4940, with notes on what you plan to continue or what specific changes you will make. | **SPA** |
| **3** | Career Development Plan Update | **Milestone** | **SPA** |
| **4** | Elevator Talks | **Milestone** | |
| **5** | | | |
| **6** | | **Milestone:** Follow-up to week 2 reflection; report on outcome of any changes made. | |
| **7** | Notebook Check | | **SPA/ SPRA** |
| **8** | Outline of Oral Presentation | **Milestone:** Send outline of oral presentation to SPA and SPRA. | **SPA** |
| **9** | Outline of Final Written Report | **Milestone:** Send outline of final report to SPA and SPRA. | **SPA** |
| **10** | Check-in | **Milestone** | |
| **11** | Practice Talks | **Milestone:** Give a practice talk to student/SPA audience. | **SPA** |
| **12** | | | |
| **13** | Draft Written Report | **Milestone:** Send draft of final report to SPA and SPRA. | **SPA** |
| **14** | **Senior Project Talks** | **Milestone:** Final oral presentation about project. | **SPA/ SPRA** |
| **Finals Week** | **Final report is due no later than noon on Wednesday of finals week.** | | **SPA/ SPRA** |

**Assignment Descriptions**

| Component | Description |
|---|---|
| Research Notebook | Students will chronicle all aspects of their senior project in this bound notebook including progress, meetings, planning, data taking, analysis, etc. For most students this will be a bound notebook, but it may be electronic if the SPRA agrees that is appropriate and the whole notebook can be submitted for feedback/grading. |
| Progress Reports | Students must submit a 2 page summary of progress on their projects including a project description, goals, work done to date, problems, future goals, analysis performed, etc. The project advisor will submit written feedback. It is recommended that this update include outlines of both the final paper and presentation. |
| Final Written Report | Students must complete a minimum 4 page report summarizing their senior project in the format of an academic journal which has been selected by the project advisor. At the conclusion of the first term, students must at least complete a draft of this document despite not having completed the project. Students will submit drafts of the final report and will receive written feedback from the advisor so that the students may submit a revised final draft. |
| Oral Presentation | All students will give a presentation of their work to the department near the end of the second semester in which they complete their project. |

# Wright State University Department of Physics
# Application for Senior Thesis Project (PHY 4940)

Student's Name: _____

Date of Application: _____

Student has Senior Standing in Physics (Required): Yes _____ No _____

Student must have, at the very minimum, completed the following courses:
*PHY 2400, PHY 2410, PHY 2420, PHY 3500, PHY 3510*

*Please include with this document a printed one-page description of your research project in the following format:*

- Title of Project
- Student Name
- Advisor(s)
- Project Statement
- Motivation/Rationale
- Methodology
- Intellectual Merit

# of course hours of PHY 4940 student will register for: Fall _____ Spring _____

Projected Date of Completion: _____

Proposed Project Advisor (Co-Advisors As Needed): _____

Approved: _____ Date: _____
Faculty, Senior Project Research Advisor (Co-Advisor) Comments:

Approved: _____ Date: _____
Chair, Undergraduate Studies Committee Comments:

Approved: _____ Date: _____
Faculty, Senior Project Research Advisor Comments:

## Wright State University Department of Physics
## Senior Thesis Project (PHY 4940) Contract

- By signing this document, all parties affirm that they have reviewed and discussed all aspects, responsibilities, and deadlines associated with PHY 4940 and the Senior Thesis Project.
- All parties agree to their roles and responsibilities as outlined in the PHY 4940 Senior Thesis Project Guidelines and Syllabus.
- All signing parties agree to respect and adhere to policies and deadlines associated with the Senior Thesis Project.
- All signing parties understand that failure to deliver work on time and of sufficient quality could result in a non-passing grade for PHY 4940 and a delay in graduation.

Student's Name: _____

Signature: _____ Date _____

Senior Project Research Advisor's Name: _____

Signature: _____Date _____

Senior Project Research Co-Advisor's Name: _____

Signature: _____Date _____

# Physics-Dual Degree 4+1 Combined BS/MS Program

The attached curriculum shows paths to the BS+MS degrees over 5 years listing all required courses and the required number of electives. The two sequences reflect the alternate year offerings of some graduate courses. Specifically, this curriculum

a) includes all required courses for the BS in Physics;

b) includes all required courses for the Physics Masters degree;

c) includes 3 elective courses (9 to 10 semester credits depending on choice of courses).

d) uses 2 elective courses (6 semester credits) in the Physics BS curriculum for required grad courses.

Required courses which can be double counted for both degrees are:

**PHY4730/6730 PHY4800/6800 PHY4810/6810 PHY4830/6830**

(13 semester credits) in the primary year sequence and

**PHY4730/6730 PHY4830/6830 PHY7100, PHY7120**

in the alternate year sequence.

Elective courses which may be double counted for the both degrees include:

**PHY4270/6270 PHY4320/6320 PHY4430/6430 PHY4630/6630,**
**PHY4610/6610 PHY4620/6620**

Each semester in the first four years of the model curriculum is 16 semester hours or less which is consistent with the normal undergraduate curriculum. Each semester in the fifth year of the model curriculum is 11 semester hours or less, consistent with normal graduate curriculum.

**Admissions Requirements**

Any student in the Physics BS program may petition to enter the 5 Year Physics Masters program during the semester prior to completing 60 semester hours of the model curriculum with a 3.2 average, including PHY 2400, 2410, 2420; and obtaining a 3.3 average in required physics and math courses taken to date.

The petition must be approved by the Physics Department Graduate Studies Committee and the Physics Department Chair and be forwarded to the Graduate School for final approval and admission to the degree program. The graduate studies committee and/or the chair may consult a petitioner's former instructors regarding suitability if they choose.

The admission to the program will normally be at the beginning of subsequent semester after approval. An intending student must then seek advising each term to make sure they are following the necessary curriculum to eventually complete the program.

# Physics-Dual Degree 4+1 Combined BS/MS Program

## Curriculum summary:

| | | | | | |
|---|---|---|---|---|---|
| **WSU Core:** | Standard plan | | | | |
| **Physics Core:** | PHY 1000<br>PHY 3500<br>PHY 3710 | PHY 1100<br>PHY 3510 | PHY 2420<br>PHY 4500 | PHY 3220<br>PHY 4510 | PHY 3150<br>PHY 3500 |
| **Physics Required Courses (BS):** | PHY 4600 | PHY 4610 | PHY 4830 | PHY 4940 | |
| **Related Field Requirements:** | MTH 2320<br>MTH 3330 | MTH 2330<br>CHM 1210 | MTH 2530<br>CHM 1220 | MTH 3320 | |
| **Required Masters courses:** | PHY 4730/6730<br>PHY 7100<br>PHY 8990 | PHY 4800/6800<br>PHY 7120 | PHY 4810/6810<br>PHY 8000 | | |

## Continuance in the program

A 3.0 overall GPA and a 3.0 GPA in required physics courses is required to remain in the program. Normal graduate school probation rules apply.

Upon admission to the program, academic advising and permission to register is necessary each term. (This is due to the close sequencing of courses that is necessary to meet the 5 year timeline.)

Students are eligible for financial aid based upon their enrollment status. Because participating students remain undergraduates through the completion of the bachelor's degree, they will be eligible for undergraduate financial aid through this period. Students will become eligible for graduate forms of financial aid—including Graduate Tuition Scholarships and GRAs/GTAs/GAs—when they become regularly-admitted graduate students after the completion of the bachelor's degree.

## Reversion to single degree

Reversion to the 4 year BS degree occurs if the student does not enroll in the necessary graduate courses within 2 years following completion of the Physics BS requirements. In this case, PHY6000 or PHY7000 level courses may count as elective credits toward the BS degree but not toward the curricular requirements for the BS. If reversion occurs and the student subsequently is accepted into the Physics MS, any graduate credits applied to the Physics BS cannot count toward the 30 semester credits required for the Physics MS degree.

***For more information about this program and for suggested course sequences and schedules, please visit:***

**https://science-math.wright.edu/physics/bachelor-of-science-and-master-of-science-dual-degree-in-physics**

# Society of Physics Students (SPS)

The Society of Physics Students (SPS) is a professional association explicitly designed for students. Membership, through collegiate chapters, is open to anyone interested in physics. The only requirement for membership is that you be interested in physics. Besides physics majors, our members include majors in chemistry, computer science, engineering, geology, mathematics, medicine, and other fields.

Within SPS is housed Sigma Pi Sigma, the national physics honor society, which elects members on the basis of outstanding academic achievement. This unique two-in-one society operates within the American Institute of Physics, an umbrella organization for ten other professional science societies.

The Wright State University chapter of SPS is very active and organizes several activities and opportunities throughout the school year. In the past, these have included:

- Hosting the bi-weekly department tea times, where faculty, staff, and students take a break while enjoying light refreshments.
- Performing science demonstrations at local outreach venues including the Boonshoft Museum of Discovery and TechFest.
- The Annual Department Picnic.

The current faculty advisor for the WSU Chapter of SPS is Dr. Ivan Medvedev. If you would like to learn more about WSU SPS, please contact him and he will help you get involved.

To join the Society of Physics Students National organization, apply online at:

https://www.associationsciences.org/sps/

# WRIGHT STATE UNIVERSITY

## COLLEGE OF SCIENCE & MATHEMATICS

## DEPARTMENT OF PHYSICS


**248 Fawcett Hall**

**3640 Colonel Glenn Hwy**

**Dayton, OH 45435**

**Phone: (937)775-2955**
**Email: physics@wright.edu**
**Website: http://science-math.wright.edu/physics**





**Authored by Dr. Jason Deibel**



**Last revision 1/2020**