

Advising Notes for Physics Majors

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These notes outline suggestions and considerations that Physics majors should take into account when planning their classes. Please look over them carefully, as failure to follow some of these guidelines may prevent students from taking desired courses or even from graduating on time. For a full listing of the requirements for the Physics major, see the UC Merced Academic Catalog at <http://catalog.ucmerced.edu/>.

For those of you new to our program, each physics major has two advisors: a *physics advisor*, which is one of the physics faculty, and an *academic advisor*, which is Erica Robbins in the SNS Dean's office. Your *physics advisor* offers you disciplinary expertise on course content; advice for timing courses; and advice for pursuing research, internships, and a physics-related career. Your *academic advisor* offers guidance on meeting all campus, School, and Major requirements for graduation.

Our favorable faculty-to-student ratio allows us to provide this extra guidance, which is particularly helpful since the majority of our core and all elective courses are offered in specific semesters and/or years. Timing is essential. When students don't take certain courses in a timely manner, there is a ripple effect that can impact their time to graduation. We're here to help. And we believe this face-to-face contact is so important that all majors are required to talk to their faculty advisor at least once a year. You are **required** to meet with your physics advisor before registering for Fall/Spring courses via a hold placed on your registration. This is only lifted after you've met with your **physics advisor**.

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1 Notes by Year

1.1 General Considerations

The required number of electives for the major are the minimum you need to graduate. *As a physics major, you should try to take as much physics and math as possible.* See the tables in Section 3 for information on when classes are offered and when you should take them. Starting research in your sophomore or junior year (rather than waiting until senior year) is an additional way to prepare for graduate school and/or further immerse yourself in the field. If you're pursuing a physics emphasis, the timing of electives is important as these may only be offered every other year.

1.2 Freshman Year

Do not put off the introductory Physics courses, PHYS 8 and 9 (or 8H and 9H), or the single-variable calculus sequence, MATH 21 and 22. These physics courses are the only ones offered every term, including the summer session. (See Section 3.) Ideally, you should complete these four physics and math courses by the end of your freshman year. If this proves impossible, it is better to take PHYS 9, or its equivalent, over the summer rather than taking PHYS 9 and 10 concurrently during the fall of your sophomore year.

Warning! MATH 22 can be taken concurrently with PHYS 9, and MATH 24 can be taken concurrently with PHYS 10. However, MATH 22 is a *pre-requisite* for MATH 24, which could prevent you from taking PHYS 9 and PHYS 10 concurrently.

1.3 Sophomore Year

If possible, you should take PHYS 10 in the Fall of your sophomore year. Postponing PHYS 10 will set you back a year and may delay your graduation! And, PHYS 10 is only offered during the fall semester. By the end of your sophomore year, you should have completed your core calculus sequence: MATH 21, 22, 23, and 24. Consider starting research with a faculty member.

Phys 10 labs. Previously, labs were split over two weeks, with each lab session lasting 3 hours. Now, each lab is completed in one session, lasting 6 hours, and students have a lab every other week. This eliminates the two lab sessions needing to share (and necessarily interfere with each other's) lab setups.

Summer Internships Consider applying for summer research experiences or internships. Deadlines are typically January - March, and advertising starts in the Fall. Robert Goodman is the STEM Career Specialist at the Center for Career & Professional Advancement and can also help you identify research and internship opportunities.

1.4 Junior Year

Begin taking some of your Physics electives, especially since most of them are offered every other year. Also, remember that if you want to go to graduate school in Physics, you should (1) take the

Physics GRE subject test in the Fall of your senior year and (2) engage in research with faculty *early*. The more Physics you take in your junior year, the better prepared you will be! **Before the end of your junior year**, make sure that you have found a faculty member with whom you can complete your senior thesis (even if you plan on starting research in your senior year).

1.5 Senior Year

You must complete a total of four units of research: two in PHYS 195 and two in PHYS 196. Typically, students sign up for 2 units of research each semester with their thesis advisor. Senior year research is broken up into two different course numbers because your thesis is due at the end of PHYS 196. All graduating senior-year student **must** enroll in PHYS 196 to fulfill the thesis requirement. Also, these four units of research must be taken for a letter grade. If you're considering graduate school (1) take the GRE during the fall of your senior year and (2) take as many physics (and math) electives as possible.

After UC Merced. Take the next step by researching graduate programs, professional programs, and/or job opportunities while in your senior year. Graduate applications are typically due in late Fall. Career Services has a number of resources, including a STEM Career Specialist, to help prepare for the job market.

2 Administrative Issues

Hold on Registration To ensure you meet with your physics advisor at least once per year, in the Spring semester there is a hold placed on your registration. This is lifted only after meeting with your physics advisor. Afterward, he or she will email the Natural Sciences Academic Advisor Jenn Souza (jsouza5@ucmerced.edu), requesting that the hold be lifted; which will be applied usually within one business day.

Timing for Meeting with your Physics Advisor The course schedule is usually available a month before registration opens. In general, registration for spring classes opens in early November, and in April for fall classes. Contact your physics advisor for a meeting well before registration opens.

General Catalog A student is subject to the policies in the General Catalog in effect when they initially enroll. The current and archived copies of the catalog are available from the registrar's website (<http://catalog.ucmerced.edu/>). Students may also petition to adopt the policies in a newer catalog. *If possible, we recommend that students adopt changes in major requirements when we make them.*

Requirements for the Physics Major The requirements for the major as well as the various emphasis tracks are listed in the General Catalog.

Early Progress Policy Any Natural Sciences major must pass the first course in the Math and Chemistry sequences—MATH 005 (or MATH 011 or MATH 021) and CHEM 001 (or CHEM 002)—prior to the start of their third regular (Fall/Spring) semester. Any student failing to do

so will be moved to undeclared status. Please see the NS Advising website or your academic advisor if you have questions. **Understand that this does NOT specify that you must take Chemistry your first semester at UC Merced. If you're deciding between Physics 8 and Chemistry for the fall term, we advise taking Physics 8.**

Normal Progress to Degree UC Merced undergraduate degree programs are designed to be completed in eight semesters or four academic years. (Summer terms are not included in the semester count.) To meet the normal progress requirement, undergraduate students are expected to enroll in and pass an average of 15 units per semester, completing the 120 units necessary for graduation in four years. An extension of enrollment beyond nine semesters requires the approval of the students School.

3 Timing of Physics Course Offerings

As you can see from the tables below, some classes are offered every term, while others only once a year. Taking required classes in a timely manner (along with important math pre- and co-requisites) will ensure you graduate on time. **The timing of key courses are in bold.** *These requirements correspond to the 2017-2018 General Catalog. The requirements and the timing of courses are subject to change.*

Required Courses Required courses are offered every year in the terms indicated. See Table 1.

Elective Courses Most elective courses are being offered every other year. Note that courses not meeting the minimum enrollment (typically 8 students) are subject to cancellation. See Table 2.

4 Society of Physics Students (SPS)

Initially founded with the concern that there was no local organization dedicated to promoting and advancing physics education within our community. The University of California, Merced Chapter of the Society of Physics Students aims to provide students with the resources necessary to make educated and informed career decisions.

This organization aims to uphold the ideals established by the national branch of the Society of Physics Students as well as those implemented by the University of California, Merced.

Physics students can check more information of the SPS from the website:
<https://catlife.ucmerced.edu/organization/physicsstudents>.

Table 1: *Tentative* Schedule of Required Courses. The timing of key courses are in bold; delaying these courses can delay your time to graduation.

Courses	Prereqs, (Coreqs), [Recommended] ¹	F	S	Su	Year
PHYS 8, 8H: Intro I	(M21)	X	X	X ²	Freshman
PHYS 9, 9H: Intro II	P8, (M22)	X	X	X ²	Freshman
PHYS 10: Intro III	P9, (M24)	X			Sophomore ³
PHYS 105: Mechanics	P8, (M23, M24)		X		Sophomore
PHYS 108: Thermal Physics	P9	X			Soph. ⁴ or Junior
PHYS 110: Electrodynamics	P9, M24	X			Junior
PHYS 115: Electrodynamics II	P110		X		Junior
PHYS 126: Sp. Relativity mini	P9, [P110]		X		Sophomore
PHYS 137: Quantum Mechanics	P10, M23, M24	X			Junior
PHYS 138: Quantum Mechanics II	P137		X		Junior
PHYS 160: Modern Physics Lab	P10		X		Junior
PHYS 195: Ugrad Research		X	X	X	Junior/Senior
PHYS 196: Thesis Research		X	X	X	Senior

¹ P = PHYS, M = MATH, C = CHEM.

² Honors courses not offered during summer session.

³ You may take PHYS 9 and 10 concurrently, but see the **Warning** under Freshman Year. If possible, it is better to take PHYS 9 or its equivalent over the summer.

⁴ Preferred.

Table 2: *Tentative* Schedule of Elective Courses. We're working to make this schedule reliable so that you may plan, especially for electives needed for your emphasis, etc.

Courses	Prereqs, (Coreqs), [Recommended] ¹	F	S	Offered
PHYS 104: Biophysics	P8, P9	X		Even years
PHYS 109: Soft Matter	P10, P108		X	Odd years
PHYS 112/212: Stat. Mechanics ²	P108		X	Yearly
PHYS 116: Math. Methods	P9, M23, M24	X		Odd years
PHYS 141: Condensed Matter	P10 or C113, P108 or C113	X		Yearly
PHYS 144: Modern Atomic Physics	PHYS 137		X	Even years
PHYS 148: Modern Optics	P9, M23, M24		X	Even years
PHYS 161: Astrophysics	P9, M22		X	Odd years
PHYS 172: Quantum Information ³	P137	X		Odd years
PHYS 180: Non-Linear Dyn.	P9, M23, M24, [P105]	X		Even years

¹ P = PHYS, M = MATH, C = CHEM.

² If PHYS 112 is not offered, sign up for PHYS 212.

³ If PHYS 172 is not offered, sign up for PHYS 192/292.

⁴ Even/odd refers to academic year. For example, Spring 2018 is referred to as Odd year in the 2017 academic year.