Academic Requirements
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Origin of Requirements

- State of NJ
- Rutgers School of Graduate Studies
- Physics and Astronomy graduate program

- State / SGS requirements are generally pretty inflexible
- Program requirements are set by us, so we have some flexibility, if approved by Graduate Studies
  - E.g., allow an extension of time to complete Ph.D. qualifiers
M.S. Requirements
State / SGS requirements for M.S. with essay

- Continuous registration
- 30 course credits
- Essay
  - We have no written guidelines about what constitutes an essay.
- Comprehensive exam
  - Approval by 3 faculty
- Ph.D. students can get an M.S. with essay after passing the qualifier and earning 30 course credits.
State / SGS requirements for M.S. with thesis

- Continuous registration
- 24 course credits + 6 research credits (16:750:701 and 702)
- Thesis
  - We have no written guidelines about what constitutes a thesis.
- Comprehensive exam
  - Approval by 3 faculty
- What is the difference between a thesis and an essay?
Program requirements for M.S.

• Comprehensive exam:
  • Oral presentation of work described in essay / thesis to a 4 person committee, followed by answering questions.
  • All 4 faculty sign your M.S. degree application.

• There is no "timeline" for an M.S. degree.
• There is no detailed course requirement, as we have for Ph.D. degree.
New: M.S. in Quantum Science

- New program, just approved by SAS and SGS, intending to start fall 2024
- Continuous registration
- 30 course credits + 6 research credits (16:750:701 and 702)
  - Relatively strict list of courses to be taken
- Internship component
- Thesis
- Comprehensive exam
  - Approval by 3 (4) faculty; expect to be same as before
M.S. in Quantum Science Courses

**Semester I:**
i) Quantum Mechanics I (501)
ii) Solid State Physics I (601)
iii) Quantum Optics / Computational Physics (509)

**Semester II:**
i) Quantum Mechanics II (502)
ii) Quantum Computing I
iii) Solid State Physics II (602) / Machine Learning (568)

**Semester III:**
i) Quantum Computing II
ii) Many Body Physics I (620) / Quantum Algorithms (CS 583)

**Semester IV:**
i) Solid State Physics III (603)
ii) Advanced Topics (624)  

*New courses*
State / SGS requirements for Ph.D.

• Continuous registration
• 72 credits including 24 research credits (16:750:701 and 702)
• Ph.D. qualifier / ``advancement to candidacy’’
• Thesis / dissertation
• Final exam
  • Oral presentation of work described in thesis to a 4 person committee, one external member, followed by answering questions
• IDPs - individual development plans now ``required’’ by SGS, especially for students after 7th year
Ph.D. qualifier

- Brief note to Qualifier Committee Chair by Sep 1:
  - Name
  - Adviser
  - Couple sentence description
  - Allows committee to be assigned
- Generally taken by Dec 1
- After you pass, do the paperwork!
  - [https://grad.rutgers.edu/academics/forms?&location=23](https://grad.rutgers.edu/academics/forms?&location=23)
  - We do NOT have a language requirement.
Program requirements for Ph.D.

- Core course requirement
  - Must pass course or challenge exam within 4 terms
- Ph.D. qualifier requirement
  - Must pass within 4 terms
- Advanced course requirement
  - Must take 2 advanced in-area and 2 advanced out-of-area courses
- Final exam
  - Oral presentation of work described in thesis to a 5 person committee, one external member, followed by answering questions
Program requirements for Physics

• Core course requirement
  • Physics: 501, 502, 503, 504, 507, 611
  • Astronomy 501, 503, 507, 514, 607 or 608

• Advanced course requirement
  • Astronomy: 606 Stars & Planets, 607 Galaxies, 608 Cosmology, 610 Interstellar Matter
  • Biophysics: 567 Living Matter
  • Condensed Matter: 601, 602, 603 Solid State, 620, 621 Many Body
  • General Relativity: 617
  • Subatomic Physics: 605 Nuclei, 613 Particles, 615 Overview QFT, 616 Field I, 618 Group Theory, 619 Fields II
  • Also advanced / special topics classes
Program requirements for Physics

- Core course requirement
  - Physics: 501, 502, 503, 504, 507, 611
  - Astronomy: 501, 503, 507, 514, 607 or 608
- Advanced course requirement
  - Biophysics: 567 Living Matter
  - Condensed Matter: 601, 602, 603 Solid State, 620, 621 Many Body
  - General Relativity: 617
  - Subatomic Physics: 605 Nuclei, 613 Particles, 615 Overview QFT, 616 Field I, 618 Group Theory, 619 Fields II
- Also advanced / special topics classes

Take 2 in your area, 1 in each of 2 other areas.
Program requirements for Physics

- **Core course requirement**
  - Physics: 501, 502, 503, 504, 507, 611
  - Astronomy: 501, 503, 507, 514, 607 or 608

- **Advanced course requirement**
  - Biophysics: 567 Living Matter
  - Condensed Matter: 601, 602, 603 Solid State, 620, 621 Many body
  - General Relativity: 617
  - Subatomic Physics: 605 Nuclei, 613 Particles, 615 Overview QFT, 616 Field I, 618 Group Theory, 619 Fields II
  - Also advanced / special topics classes

**Issues**: There are also lots of technology course that do not satisfy the in/out-of-area requirement. Sometimes I allow them when for the first few years we run them.

There is overlap in the areas: e.g. QFT is also really in-area for some in CMT.

Occasionally I discuss with Grad Studies whether we should update this system... no changes so far.
Making sure you fulfill requirements
Register each term

- Register your appointment (counts towards full / half time status, but not toward Ph.D.)
  - Fellows register for course 811, 0 credits.
  - GAs register for course 866, 6 GA credits.
  - TAs, register for course 877, 6 TA credits.
- Register for courses
- Register for research - [https://classes.rutgers.edu//soc/#courses?subject=750&semester=12024&campus=NB&level=G](https://classes.rutgers.edu//soc/#courses?subject=750&semester=12024&campus=NB&level=G)
  - [https://physics.rutgers.edu/academics/graduate-program/registering-for-classes-and-appointment](https://physics.rutgers.edu/academics/graduate-program/registering-for-classes-and-appointment)
- Check your health insurance is correct or waived as needed
- Wait for your tuition / fees to be paid
- Take lots of credits as TAs in 1st and 2nd year, so you need fewer later on as a GA. Nearly every year there is a student who wishes they had taken more credits earlier.
Do your research

After Ph.D. qualifier

• GPD appoints a 4-person committee, usually:
  • Ph.D. adviser
  • Second faculty from your area
  • Faculty on the opposite side of experiment vs. theory
  • Faculty from other area on same side of experiment vs. theory
• Some students switch advisers - this was done by 2 4\textsuperscript{th}-year students in last few months.
• Have an annual meeting with your committee - giving talks is fun!
• I try to check up on your registrations and progress in late August, January, and May, but might be too busy, and usually only email once you are ~ 4\textsuperscript{th} year and are not heading towards completing requirements