Information Session on Physics Honours and further postgraduate study

Associate Professor Bruce Yabsley
Honours Coordinator for the School of Physics
physics.honours@sydney.edu.au

Monday, 10th September 2018

1. Introduction (HC)
2. Postgraduate study and research (PG coordinator)
3. General introduction to honours (HC)
4. Introduction to individual lecture courses (lecturers)
5. Introduction to research projects (HC)
6. Free discussion with academic staff and other students
1) Introduction

- Welcome to the School of Physics!
- This is a resource for those thinking of study beyond bachelor’s level.
- The assumption is that you are close to completing a bachelor’s, with a major in physics.
- We do *not* assume that you’re already studying here — we regularly take students from an undergraduate background at other institutions.
- Physics is not for everyone, but physics is special — that part of the natural sciences where the objects of study are big enough, small enough, or simple enough to yield to a mix of experimental tests, mathematical analysis, fundamental inquiry, and physical intuition.
- Physics has open borders with maths and engineering, but also with chemistry, geology, biology, philosophy, IT, environmental science . . . not to mention astronomy, to which physics is joined at the hip (in the US this would be called a department of “Physics and Astronomy”)
- Most of today is about honours, but we will start with PG study:
(2) Postgraduate study and research
(3) General introduction to honours

- honours is a fourth year of undergraduate work, fully devoted to one subject — physics, in this case

- students take an honours year for a variety of reasons:
  - to extend and “round out” their studies in their favourite subject
  - as the (≈ necessary) next step towards higher academic study
  - to “try [physics] on for size” as a discipline
  - as training and/or enrichment for “unrelated” work

- the mix in honours varies between fields; in physics, it’s
  - 50% coursework: six advanced-level courses (4CP-equivalent)
  - 50% research: a single, large research project taken over eight months

- honours is probably quite unlike the work you have done up to now:
  - you are dedicated to a single area of study
  - the work is academically more demanding
  - you will be apprenticed to a research group all year
  - tasks with qualitatively different time demands must be balanced
  - you will likely have a relatively close cohort
(3) General introduction: enrolment

- formal enrolment is with the Faculty of Science within the university:

- by 30th November (for 2019 S1) or 30th June (for 2019 S2)

- the key requirements are:
  - a bachelor of science (or equivalent)
  - a major in physics
  - a SciWAM of 65 or greater: essentially a credit average at intermediate and senior level
  - an academic willing to supervise you on a research project; they must agree by formal email, cc:physics.honours@sydney.edu.au

- you may need to wait on current coursework, fees, and other administrative matters, before receiving an offer; sometimes, there is a delay between the provisional offer and the final offer

- I manage the physics end (as honours coordinator), but you must deal directly with admissions; I can help in some circumstances
(3) General introduction: coursework

- coursework is worth 50% of your honours mark
- the standard load is 6 “full courses” of 20 lectures each, 4 of which must be from the physics honours programme; we also offer 10-lecture “half courses”
- the mix of assignments, projects, presentations, and exams varies between the courses; the usual 5%-per-day late penalties apply
- you sign up for each semester’s courses by the end of week 2
- exams are usually in week 14 (“stuvac”) & 15 (“exam week 1”)
- you may also take courses outside our honours programme:
  - senior, honours, or masters level
  - maths, IT, data science, and engineering are popular
  - HPS, chemistry, & medicine courses have been taken on occasion
  - approved case-by-case by the honours coordinator; the lecturer / course coordinator must also agree
  - formally, you do not enrol, but you audit the course and the lecturer then sends the mark to physics.honours@sydney.edu.au
- consultation with your research supervisor is strongly encouraged
(3) General introduction: the list of courses

SEMESTER 1:
- **AET**: Advanced Electromagnetic Theory
- **AOP**: Advanced Optical Physics
- **NP**: Nuclear Physics
- **QFT**: Quantum Field Theory

Half-courses:
- **BRI**: Bayesian Reasoning and Inference
- **KT**: Kinetic Theory
- **SP**: Space Physics
- **TLP**: Teaching and Learning Physics

SEMESTER 2:
- **GR**: General Relativity
- **PCBAP**: Particle Cosmology and Baryonic Astrophysics
- **PSM**: Physics of the Standard Model
- **QN**: Quantum Nanoscience

Half-courses:
- **BIO**: Biophysics
- **MLDI**: Machine Learning and Data Inference
- **ND**: Neurodynamics
(3) General introduction: 2018 S2 timetable

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<tr>
<th></th>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
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<tbody>
<tr>
<td>10 am</td>
<td>PSM: Physics of the Standard Model (wks 1-8)</td>
<td>PCBAP: Particle Cosmology and Baryonic Astrophysics (wks 1-4,7,9)</td>
<td>PSM: Physics of the Standard Model (wks 1-7)</td>
<td>PCBAP: Particle Cosmology and Baryonic Astrophysics (wks 1-4,6-7,9)</td>
<td>PSM: Physics of the Standard Model (wks 1-7)</td>
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<td>11 am</td>
<td>PHYSICS COLLOQUIUM (Slade)</td>
<td>SP: Space Physics (weeks 4-8)</td>
<td>HONOURS RESERVE SLOT</td>
<td>SP: Space Physics (wks 4-8)</td>
<td>HONOURS RESERVE SLOT</td>
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<td>12 noon</td>
<td>KT: Kinetic Theory (wks 2-4)</td>
<td>QN:Quantum Nanoscience (wks 1-6,8-11)</td>
<td>KT: Kinetic Theory (wks 2-3), MLDI: Machine Learning and Data Inference (wks 6-10)</td>
<td>QN (wks 1-6,8-11)</td>
<td>KT: Kinetic Theory (wks 2-3), MLDI: Machine Learning and Data Inference (wks 6-10)</td>
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<td>1 pm</td>
<td>KT: Kinetic Theory (wks 2-4)</td>
<td>KT: Kinetic Theory (wks 2-4)</td>
<td>KT: Kinetic Theory (wks 2-3)</td>
<td>KT: Kinetic Theory (wks 2-3)</td>
<td>KT: Kinetic Theory (wks 2-3)</td>
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<td>2 pm</td>
<td>BIO: Biophysics (wks 1-5)</td>
<td>PCBAP: Particle Cosmology and Baryonic Astrophysics (wks 1-4,6-7,9)</td>
<td>BIO: Biophysics (wks 1-5)</td>
<td>BIO: Biophysics (wks 1-5)</td>
<td>BIO: Biophysics (wks 1-5)</td>
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<td>3 pm</td>
<td>ND: Neurodynamics (wks 4-8)</td>
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- courses are variously 2, 3, or 4 lectures/wk, all in SNH 3003
- we try to avoid assignment clashes, but you will have an uneven load
- the Colloquium is usually Monday 11:00 in the Slade: you should attend
SEMESTER 1:

- **AET**: Advanced Electromagnetic Theory (Serdar Kuyucak)
- **AOP**: Advanced Optical Physics
  (Stefano Palomba, Andrea Blanco Redondo, Ben Eggleton)
- **NP**: Nuclear Physics (Bruce Yabsley)
- **QFT**: Quantum Field Theory (Archil Kobakhidze)

Half-courses:

- **BRI**: Bayesian Reasoning and Inference (Peter Tuthill)
- **KT**: Kinetic Theory (Martijn de Sterke)
- **SP**: Space Physics (Iver Cairns)
- **TLP**: Teaching and Learning Physics (Manjula Sharma)
SEMESTER 2:

- **GR**: General Relativity (Geraint Lewis)
- **PCBAP**: Particle Cosmology and Baryonic Astrophysics (Archil Kobakhidze, Joss Bland-Hawthorn)
- **PSM**: Physics of the Standard Model (Kevin Varvell)
- **QN**: Quantum Nanoscience (Stephen Bartlett)

Half-courses:

- **BIO**: Biophysics (Serdar Kuyucak)
- **MLDI**: Machine Learning and Data Inference (Peter Tuthill)
- **ND**: Neurodynamics (Pulin Gong)
(5) Introduction to research projects

- the research project is likewise worth 50% of your honours mark
- you are apprenticed to a research group, in particular to your supervisor(s):
  - to participate in the life of the group,
  - to learn (by doing) the methods of their work,
  - to learn (by instruction and osmosis) about the subject area,
  - and to carry out research work of your own
- you’ll have seen our list of research projects for 2019 posted on the web:
  - you should discuss projects that interest you directly with the staff member listed as contact
  - these projects are an indicative sample:
    - treat them as a guide to the kind of projects on offer by the various research groups and individual staff members
  - it may be possible to negotiate a project that is not on the list
- we recommend project work start three weeks before the start of lectures
- assessment is via a formal talk (10%) due by S2 week 9, and a 40pp written report (90%) due by S2 week 12, assessed by your group (who also consider your work), and ≥ 2 external examiners
the honours mark is 50% coursework and 50% research project

**conjunctive grading** applies for the final honours grades:

- **H1**: average $\geq 80$, coursework & project marks $\geq 78$
- **H2.1**: average $\geq 75$, coursework & project marks $\geq 70$
- **H2.2**: average $\geq 70$, coursework & project marks $\geq 65$
- **H3**: average $\geq 65$

**example:**

- 85 in coursework
- 77 for the research project
- 81 average mark, but the project is below the minimum standard
- **79 H2.1** final mark and grade in this case

**moral #1**: grades are meant to reflect robust achievement of a standard

**moral #2**: do not neglect your coursework *or* your research project
(3) General introduction continued: scholarships

See the Honours Scholarship section on the physics honours webpage for information:

- **University Honours Scholarships**
  - available to Australian citizens and permanent residents
  - $6000
  - you must apply

- **School of Physics Honours Scholarships**
  - available to Australian citizens and permanent residents
  - $3000
  - University of Sydney senior physics graduates automatically eligible

- **Medical Physics Honours Scholarships**

- **International Student Scholarships**

You can only hold one major scholarship.
Where to find information and help:

- https://sydney.edu.au/science/study/study-areas/physics.html under “Honours”
- https://sydney.edu.au/courses/courses/uc/bachelor-of-science-honours.html etc for enrolment
- current and previous honours students
- your (potential) supervisor(s)
- physics.studentservices@sydney.edu.au
- physics.honours@sydney.edu.au

Important dates:

- Friday 30th November 2018 enrolment deadline
- Monday 4th February 2019 start project work (“week −2”)
- Monday 25th February 2019 start of lectures (“week 1”)
(6) **Free discussion with academic staff and other students**