

Surviving your Physics & Astronomy degree: A view from the inside

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The University of Western Ontario

Outline:

- introduction
- announcements/deadlines
- modules and graduation requirements
- P&A courses
- other sources of info



Western
UNIVERSITY • CANADA

February 2, 2012

Announcements & Deadlines

■ Intent to Register Period

- Feb 1 – Mar 31

- make sure you do this, or course registration will be a problem ...

■ P & A Counselling

- Feb 1 – Mar 31

■ Physical Sciences Info Session

- Feb. 14, 1:30–4 pm

- displays from Physics & Astronomy, Chemistry, Earth Sciences and friends



■ Start of Course Registration: mid-June (after Convocation)

CAP University Prize Exam

- Annual physics exam offered at all Canadian universities.
 - This year: Tuesday, Feb. 7, 1–4 pm
 - *now with soluble problems!*
- Prizes
 - First Prize: \$500 + all expenses paid trip to the June CAP Congress
 - Second Prize: \$300
 - Third Prize: \$200
 - in addition, the top student at each university and the top 10 students overall get their names published
 - think “resume-building”

■ More info:

<http://www.cap.ca/en/activities/medals-and-awards/prizes-students/university-prize-exam>

International Astronomical Youth Camp

- A summer experience for people interested in astronomy:
 - August 5-25 near Eichendorf, Germany
 - open to people of ages 16–24
 - spend your nights observing and carrying out a research project
 - cost: €700 (includes room and board)
 - more info: www.iayc.org



Intent to Register

- You *must* complete the **Intent to Register (ITR)** process by **March 31, 2012** to be able to access course selection during summer registration.
 - so if you aren't doing an ITR, you'd better be applying to graduate
 - by **March 15**
- You *are not* selecting courses at this time.
 - ITR is when you select (or change) degree and/or module plans



Skip ITR
Procedures

- For ITR info see:

<http://www.registrar.uwo.ca/Registration/ITR.cfm>

OFFICE OF THE REGISTRAR

ADMISSIONS | STUDENT FINANCIAL SERVICES | CALENDAR | CENTRE FOR NEW STUDENTS | INFO SERVICES

- PROSPECTIVE STUDENTS
- UNDERGRAD STUDENTS
- PROFESSIONAL STUDENTS
- GRADUATE STUDENTS
- PART-TIME STUDENTS

Registration

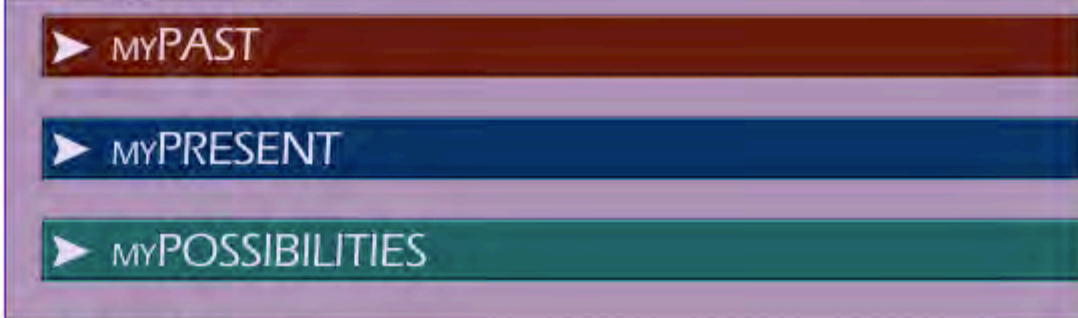
2009-2010 Intent to Register Planning Guide

Returning in September 2009?

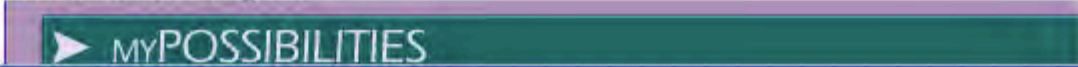
You must complete the Intent to Register process by March 31st, 2009 to be permitted access to course selection during summer registration through the Student Center. **Most students will complete the Intent to Register process using the online service.** For students unable to complete the Intent to Register process online, please see your Faculty for a paper form.

How to launch the Online Intent to Register Service

1. Log into <http://studentservices.uwo.ca>
2. Click on *myPossibilities*



3. Click on *Intent to Register*



ITR Info

- Scroll down the page to get info specific to Science...

Office of the Registrar @ The University of Western Ontario

http://www.registrar.uwo.ca/Registration/ITR-Science.cfm

Office of the Registrar @ T.

OFFICE OF THE REGISTRAR

ADMISSIONS | STUDENT FINANCIAL SERVICES | CALENDAR | CENTRE FOR NEW STUDENTS | INFO SERVICES

Registration

Intent to Register – Science and BMSc

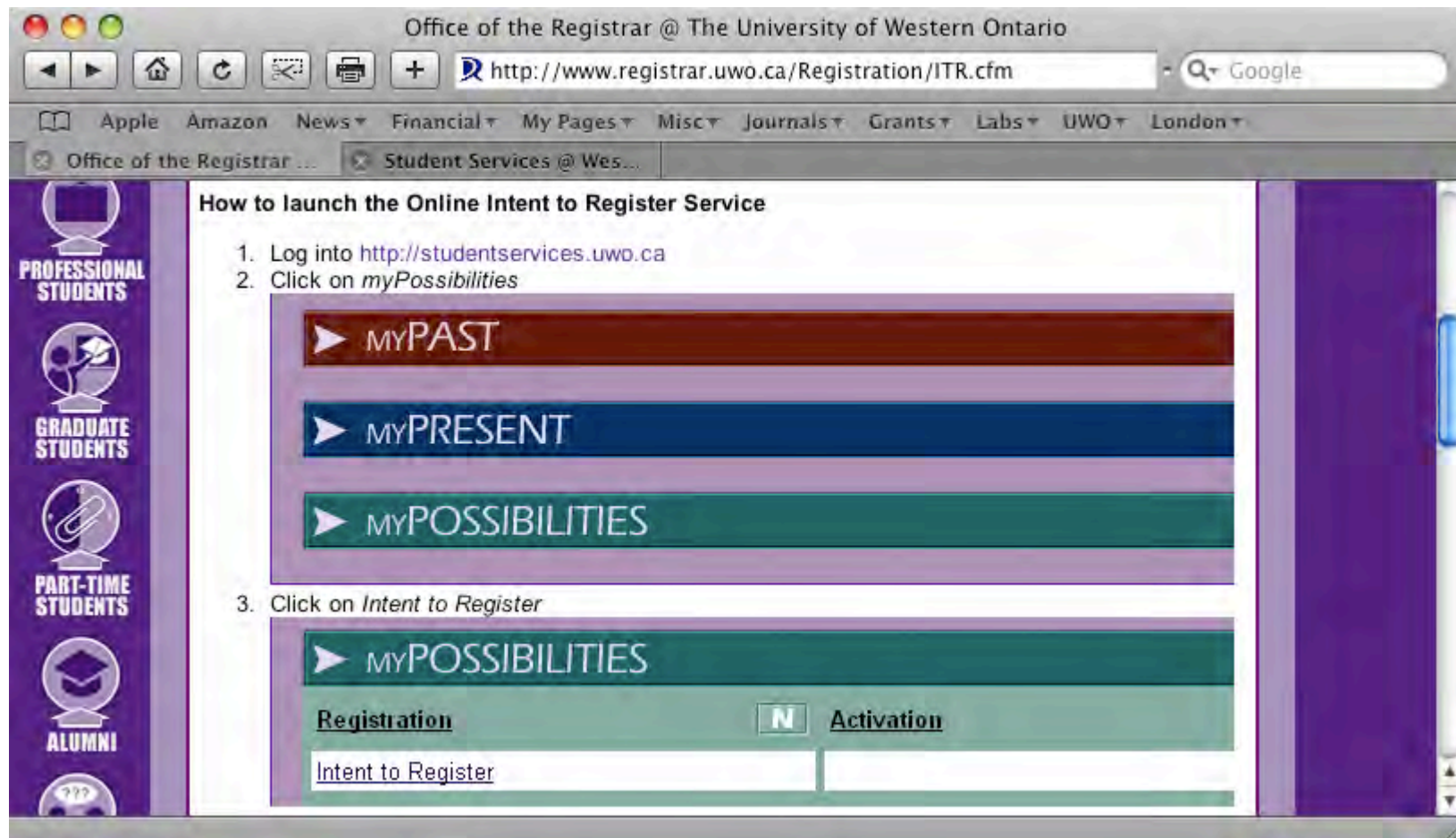
Are you planning to return to Western in September 2008? If so, you must submit an **INTENT TO REGISTER** so that you will have access to the web registration system during the summer months to register for Fall/Winter courses. If you don't submit an Intent to Register, you won't have access to the web registration system.

There are two different methods of submitting an Intent to Register:

WEB Intent to Register for ...	PAPER Intent to Register for ...
<ul style="list-style-type: none">• Students choosing the module degree structure• Students in 3rd year Scholar Electives remaining in the same module(s)	<ul style="list-style-type: none">• Concurrent degree students• Special students• Any student not taking courses this year• Post degree modules• Western Scholars or Scholars Electives Students• BA Undeclared students• Certificate and Diploma Students

ITR Process

- The ITR process is straightforward:



Office of the Registrar @ The University of Western Ontario

http://www.registrar.uwo.ca/Registration/ITR.cfm

Apple Amazon News Financial My Pages Misc Journals Grants Labs UWO London

Office of the Registrar ... Student Services @ Wes...

How to launch the Online Intent to Register Service

1. Log into <http://studentservices.uwo.ca>
2. Click on *myPossibilities*

▶ MY PAST

▶ MY PRESENT

▶ MY POSSIBILITIES

3. Click on *Intent to Register*

▶ MY POSSIBILITIES

Registration **N** **Activation**

[Intent to Register](#)

PROFESSIONAL STUDENTS

GRADUATE STUDENTS

PART-TIME STUDENTS

ALUMNI

ITR Process

■ Once you've initiated the ITR, the steps are:

1. Indicate your status

- full- or part-time

2. Click

Continue in current program

or Select your Faculty

- e.g., Science

3. Pick a degree

- e.g., B.Sc.

4. Choose a degree type

- Honors B.Sc., 4-y B.Sc., 3-y B.Sc.

and module combo

- Honors Specialization, double major, etc.

5. Select the modules

- e.g., HSP in Physics + Minor in Chemistry

ITR Process

■ Not quite done...

6. Confirm

7. Click Select 2nd choice and go through it again

- unless you are *really sure* you will get in

8. *Now* hit Exit Intent to Register

An email confirmation will be sent automatically.

■ But before you do this, make sure you are making a good choice!

Degrees are built from Modules

Degree Type	HSP	SP	Maj 1	Maj 2	Min 1	Min 2
Honors BSc	✓					
Honors BSc	✓		✓			
Honors BSc	✓				✓	
Honors BSc			✓	✓		
4-y BSc		✓				
4-y BSc		✓	✓			
4-y BSc		✓			✓	
4-y BSc			✓	✓		
4-y BSc			✓			
4-y BSc			✓		✓	
4-y BSc			✓		✓	✓
3-y BSc			✓			
3-y BSc			✓		✓	
3-y BSc					✓	✓

HSP = Honors
Specialization

SP = Specialization

Maj = Major

Min = Minor

- Western's modular system offers a great deal of flexibility to tailor your degree.

General Degree Requirements

■ Breadth Requirement

- 1.0 Course from **Category A** (Social Science, Interdisciplinary, Various)
- 1.0 Course from **Category B** (Arts & Humanities, Languages)
 - Science students will already have 1.0 from **Category C** (Science, Engineering)

■ Essay Requirement

- 2.0 **Essay** courses (E, F, G, or Z)
 - at least 1.0 must be numbered ≥ 2000

■ Additional B.Sc. Requirement

- At least 11.0 of your 20.0 courses must be from the **Faculty of Science**
 - 8.0 of 15.0 for three-year degrees

■ Module Overlaps in Science

- can double-count up to 1.0 **common** courses
- additional courses must be **substituted** by approved courses

20.0 courses for a four-year degree.

13.0–15.0 *senior* courses.

Modules in Physics & Astronomy

■ Physics

- Honors Specialization
- Specialization
- Major
- Minor



(9.0 courses after y1)

(9.0)

(6.0)

(4.0)

■ Astrophysics

- Honors Specialization
- Specialization
- Major



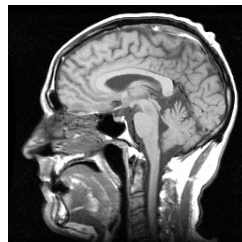
(9.0)

(9.0)

(6.0)

■ Medical Physics

- Honors Specialization
- Specialization
- Major



(9.0)

(9.0)

(6.0)

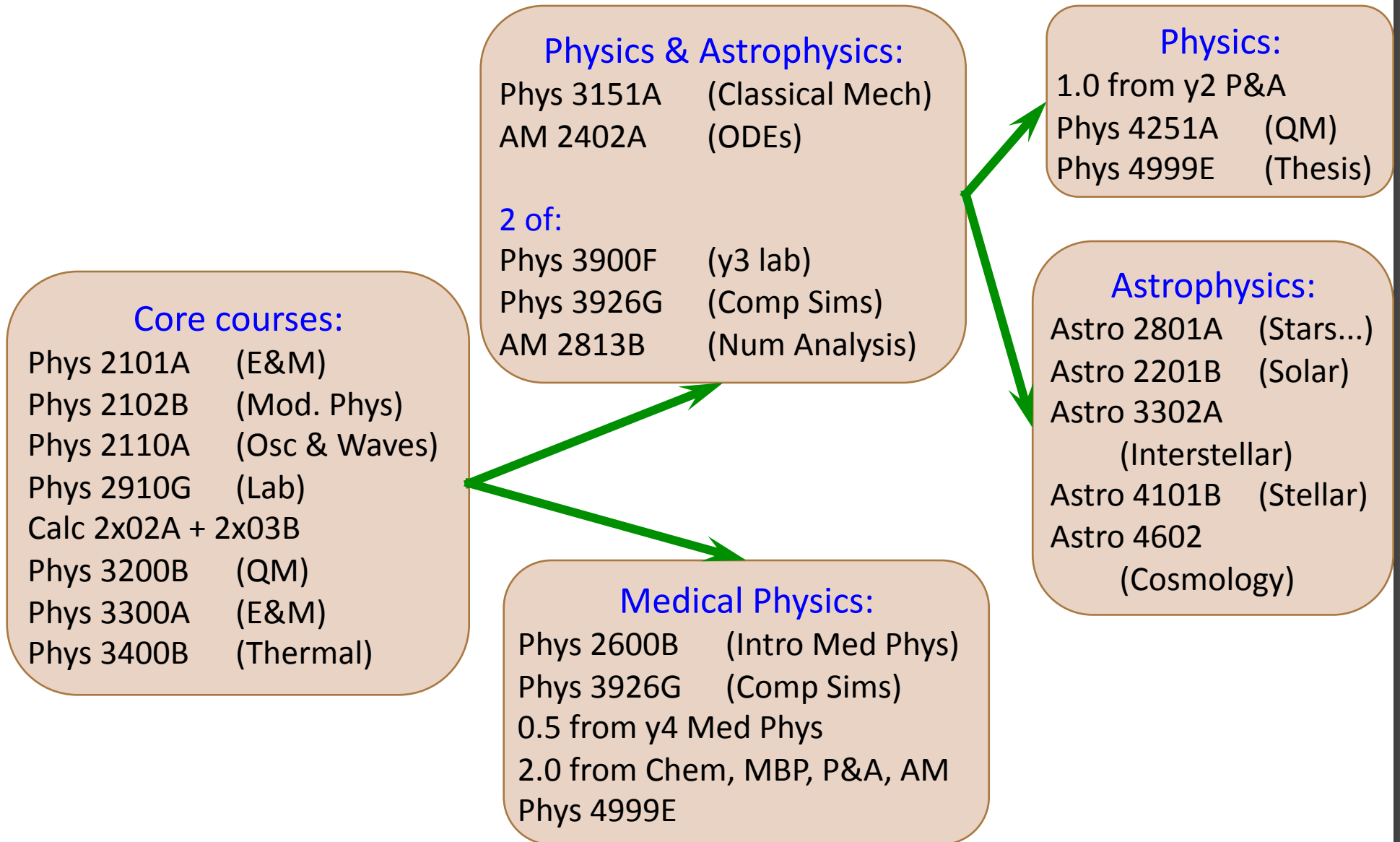
Note that we also have two “Advanced Minor” modules:

Minor in Advanced Physics

Minor in the Physics of Materials

- more to say later...

Honors Specialization Flow Chart

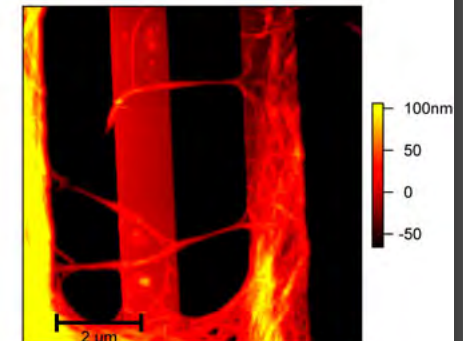


Interdisciplinary Modules

- We are also the Home Department for two Interdisciplinary modules (for now ...):

- **Materials Science** (joint with **Chemistry & Earth Sciences**)

- Honors Specialization (10.0 courses after y1)
- Specialization (9.0)
- Major (6.0)
- Minor (4.0)



- **Planetary Science** (joint with **Earth Sciences**)

- Honors Specialization (10.0)
- Specialization (10.0)
- Major (6.0)



- **Conceptual Astronomy**

- Minor (4.0)

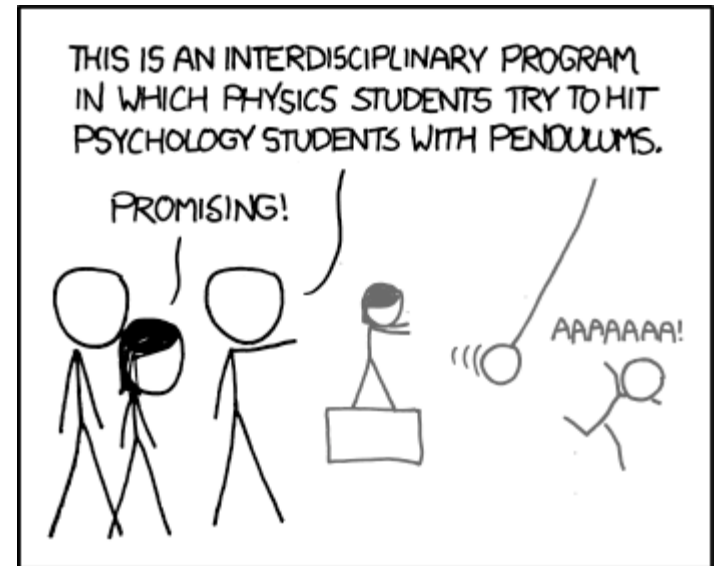
Other Possibilities

■ Combine Science with Business

- you can get an **Honors BSc** and **Ivey HBA** in 5 years
- to do that, take Business Admin 2257
- this is a competitive program

■ Combine Science with another professional degree

- e.g., **Physics + Engineering**,
Astrophysics + Music
- these will also typically take 5 years



MY PROFESSORS HAD AN ONGOING COMPETITION TO GET THE WEIRDEST THING TAKEN SERIOUSLY UNDER THE LABEL "INTERDISCIPLINARY PROGRAM."

- Choosing a module can be difficult, but keep in mind that transferring between modules within Physics & Astronomy is usually straightforward after 2nd, or even 3rd, year

Internship Program

■ The Faculty of Science has a *very* active Internship Program

- *Internship*, not *co-op*: Internship placements are for 8–16 months — enough time to make a contribution

■ Benefits of the Internship Program:

- teaches “soft skills”:
 - preparing resumes, interviewing, work ethic, preparing reports and presentations
- placements all over country with annual salaries equivalent to **>\$40k/year**
- shows the “real-world” relevance of university courses
- academic credit (report and presentation required)

More than $\frac{1}{3}$ of Western Interns are hired by their company after they graduate.

■ To be eligible, you must:

- apply by September of your 3rd year
- be a Canadian Citizen or Permanent Resident
- be a full-time student in good standing
- be returning as a full-time 4th-year student after your internship
- have completed your required 2nd year courses with a **70%** average

More info:

<http://www.uwo.ca/sci/iip/index.html>

Careers in Physics & Astronomy

■ Physics: a very flexible field

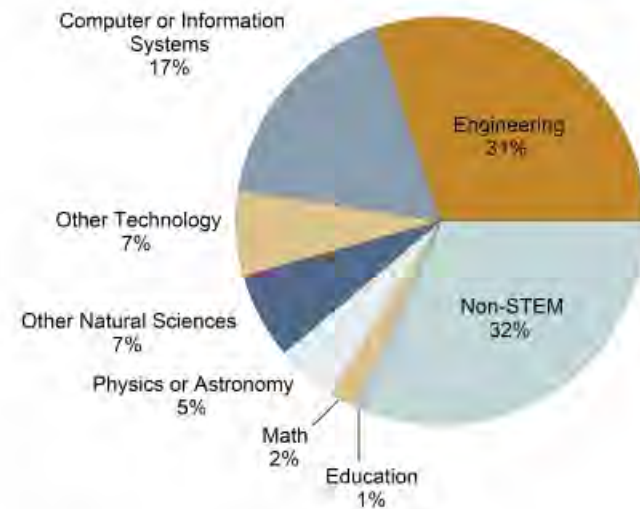
- traditionally, employers have recognized that an education in physics provides problem-solving skills, technical skills, and mathematical ability
- our graduates have gone on to careers in:

- universities
- social services
- observatories
- insurance
- government labs
- financial
- industry
- broadcasting
- computer science
- music
- engineering
- aviation
- medicine
- law
- teaching

- physicists are represented in, and have made contributions to virtually all fields

- astrophysicists and medical physicists have similar prospects (as well as some more specialized skills)

Field of Employment for Physics Bachelors in the Private Sector, Classes of 2005 and 2006

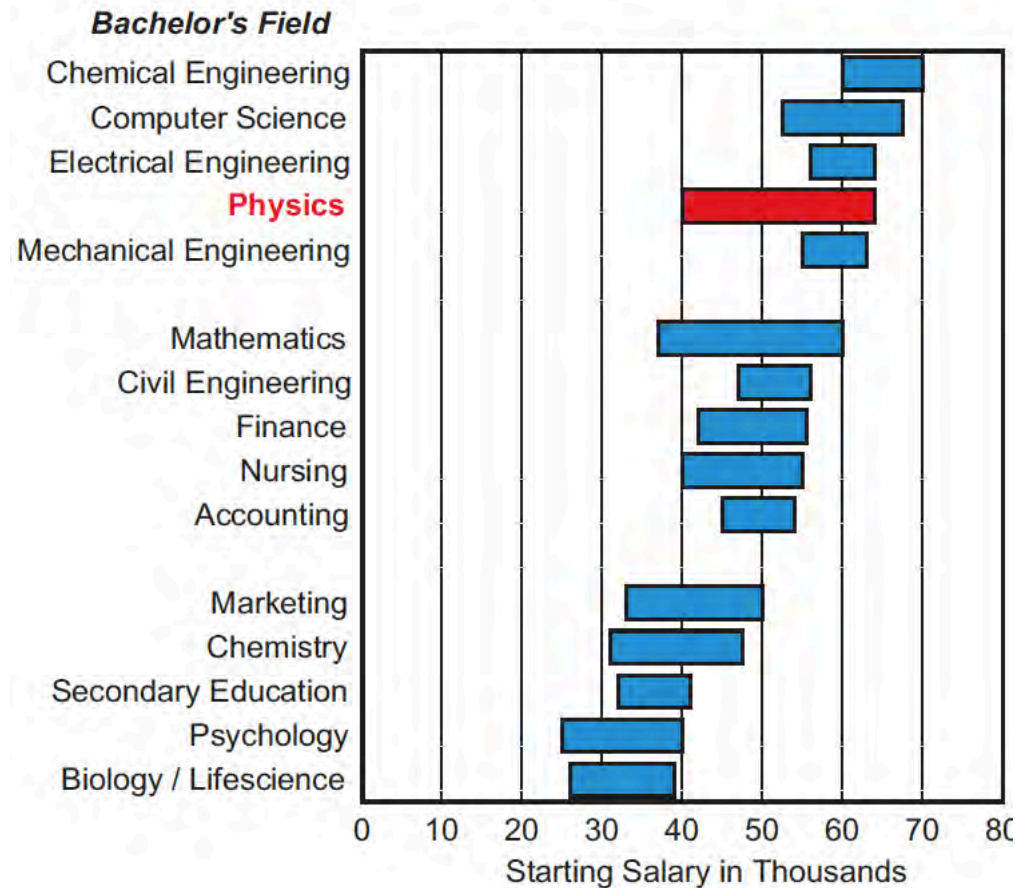


STEM: Science, Technology, Engineering and Math

AIP Statistical Research Center, Initial Employment Survey

Careers in Physics & Astronomy

- From the November 2009 *APS News*:
 - Physics Majors Pull in High Starting Salaries
- Data from the American Institute of Physics:



Thinking of Law or Medicine?

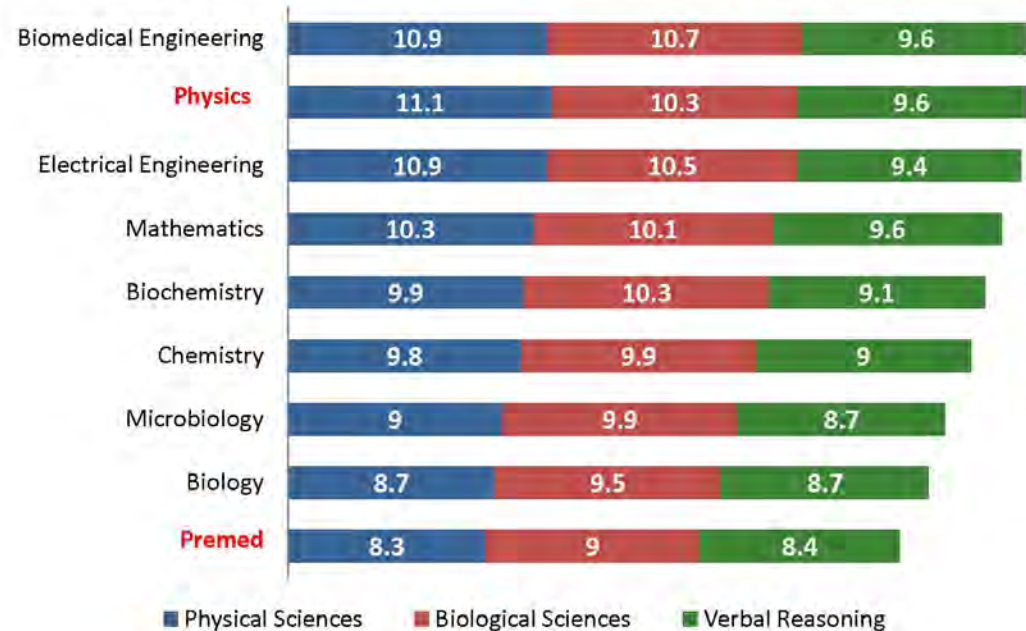
- Physics undergrads tend to do well on the LSATs.
- And MCATs.

Average LSAT Scores* by Selected Majors, 2009.

	Mean score	Number of applicants
Physics	161.5	180
Mathematics	159.7	336
Economics	157.4	3,047
Electrical Engineering	156.3	546
Mechanical Engineering	156.0	427
Chemistry	155.7	355
English	154.7	5,120
Biology	154.5	1,055
Computer Science	154.0	682
Political Science	153.0	14,964
Psychology	152.5	4,355
Pre Law	148.3	1,078
Criminal Justice	145.5	3,306
All Majors	152.6	81,530

Average MCAT Scores by Selected Majors, 2009

Scores above 9.5 in each section are considered competitive by most medical schools



Source: AIP Statistical Research Center compiled data from the Data Warehouse of the American Association of Medical Colleges

Thinking of Economics/Business/Finance?

- The **Dept. of Economics** offers graduate programs tailored specifically to Physics & Astronomy (and Math/Applied Math, etc.) graduates.
 - Economics is a highly mathematical field
 - in recent years, Economics majors in this program have been outnumbered by students from Science & Engineering

- **Contact:**
 - Prof. Igor Livshits (livshits@uwo.ca)
 - Yvonne Adams (yadams@uwo.ca)

Physics & Astronomy Counselling

- **New for this year:** students in the Seminar Class can replace one of the seminars with a counselling appointment.
- Email Prof. Hutter (jhutter@uwo.ca) and copy Prof. Holt (rholt@uwo.ca) to set this up.
- You will be matched with a member of the counselling committee member based on your field/career interests.

P&A Courses Offered (year 2)

Course	Short Title	2011– 2012	2012– 2013	2013–2014 (projected)
Physics				
2101A/B	Intermediate Electromagnetism	A	A	A
2102A/B	Intro to Modern Physics	B	B	B
2110A/B	Oscillations and Waves	A	A	A(?)
2600A/B	Intro to Medical Physics	B	B	B
2700A/B	Intro to Planetary Atmospheres	—	—	—
2810A/B	Physical Properties of Materials	B	B(?)	—?
2910F/G	Intro to Physical Measurement	G	G	G(?)
2950Y	Y2 Seminar	✓	✓	✓
Astronomy				
2201A/B	The Solar System	B	B	B
2232F/G	Sun, Earth, and Planets	G	—	G
2801A/B	Stars, Galaxies and Cosmology	A	A	A

P&A Courses Offered (year 2)

Course	Short Title	2011– 2012	2012– 2013	2013–2014 (projected)
Materials Science				
2810A/B	Intro to Materials Science	B	B(?)	—?
Physics (conceptual)				
2032A/B	The Physics of Music and Sound	—	—	—
2065A/B	Going Farther and Faster	B	B	B(?)
2070A/B	Earth's Atmosphere	—	A	—
Astronomy (conceptual)				
2021A/B	Search for Life in the Universe	—	B	?
2022A/B	Origin of the Universe	A	A/B(?)	?

Note: Science students are no longer permitted to take the “conceptual” courses

P&A Courses Offered (year 3)

Course	Short Title	2011– 2012	2012– 2013	2013–2014 (projected)
Physics				
3151A/B	Classical Mechanics I	A	A	A
3200A/B	Quantum Mechanics I	B	B	B
3300A/B	Electromagnetic Theory I	A	A	A
3380A/B	Optics and Photonics	—	A	—
3400A/B	Intro to Thermal Physics	B	B	B
3809A/B	Biological Materials	A	—	?
3900F/G	Senior Physics Lab	F	G	G(?)
3926F/G	Computer Simulations in Physics	G	F	F(?)
3950Y	Y3 Seminar	✓	✓	✓
Astronomy				
3302A/B	The Interstellar Medium	A	A	A
Planetary Science				
3380A/G	Intro to Planetary Science	—	?	?

P&A Courses Offered (year 4)

Course	Short Title	2011– 2012	2012– 2013	2013–2014 (projected)
Physics				
4251A/B	Quantum Physics II	A	A	A
4351A/B	Electromagnetic Theory II	B	B	B
4551A/B	Intro to Elementary Particles	—	?	?
4662A/B	Nuclear Magnetic Imaging	—	—(?)	?
4672A/B	Radiological Physics	A	A	A
4810A/B	Electronic Materials & Devices	—	—	?
4850A/B	Nanomaterials	B	—	B
4930A/B	Statistical Mechanics	A	A	A
4931A/B	Physical Fluid Dynamics	—	B	—
4931A/B	Atmospheric Physics	B	—	B
4950Y	Y4 Seminar	✓	✓	✓
4999E	Honors Research	✓	✓	✓

P&A Courses Offered (year 4)

Course	Short Title	2011– 2012	2012– 2013	2013–2014 (projected)
Astronomy				
4101A/B	Stellar Astrophysics	—	B	—
4602A/B	Gravitational & Cosmology	B	—	B
Materials Science				
4999E	Honors Research	—	—	?
Planetary Science				
4490E	Honors Research	✓	?	?
4830A/B	Planetary Image Interpretation	A	?	?

Know Your Competition

Subject	Natl Avg	Western
Classical Mech	1.96	1
Modern Phys	0.92	1
Quantum Mech	2.12	2
E&M	2.36	2
Thermal Phys	1.72	1
Lab	2.68	1
Computational	0.52	0
Math Methods	0.96	0
Osc & Waves	0.32	1
Optics	0.60	0
Solid State	0.28	0
Thesis	1.4	2

Subject	Natl Avg	Western
Algebra	0.56	0
Calculus	1.32	2
Diff Eqns	1.24	1
Complex Variables	0.32	0
Statistics	0.16	0

- Traditional topics in a Physics Honors degree in units of *half* courses.

Recent Course and Module Changes

- Small changes to courses modules are not uncommon
 - always check the Calendar for the most recent information.
- Some changes in progress:
 - Calc 2502A+2503B will be required for all “core” (i.e., Physics, Astrophysics, and Medical Physics) Honors Specialization modules
 - Calc 2302A+2303B will be sufficient for Specializations and the Minor in Physics
 - this will not apply to students already in these modules
- New fourth-year courses
 - Physical Fluid Dynamics & Atmospheric Physics
 - alternate years
 - Statistical Mechanics
 - every year
 - these courses will receive new “permanent” numbers
 - currently taught as “special topics”

Advanced Minors

- Two relatively new modules in Physics & Astronomy:
- **Minor in Advanced Physics**
 - designed to supplement an Honors Specialization in Physics, Astrophysics, or Medical Physics with advanced courses in Physics and Mathematics
 - particularly recommended for students planning to pursue grad studies
- **Minor in the Physics of Materials**
 - supplements a Specialization or Honors Specialization in Physics with courses relevant to condensed-matter and materials physics
 - recommended for students planning a career in materials science and engineering, or in condensed matter physics

Honors Specialization + Advanced Minor

- Adding a Minor in Advanced Physics can give you a better background than graduates of most other Physics programs.
 - even if you don't want to do an entire Advanced Minor, use it as a guide for course selection

More Information

- To plan your degree and modules before you do the intent to register, you might want to get more information from:

- The Physics & Astronomy web site: www.physics.uwo.ca

- The Registrar's web site: www.registrar.uwo.ca
 - the only *official* source

- The 2011 Academic Calendar: www.westerncalendar.uwo.ca
 - the on-line version is the *official* version
 - paper versions are no longer mass produced

- Departmental Counselling: February 1 – March 31