

Beyond First Year:

Undergraduate Degree Programs in Physics and Astronomy

12:40 – 13:45, Thursday March 14, 2018

Hennings 202

Sandwiches and drinks will be served

12:40 **Colin Gay, Department Head and Salena Li, Undergraduate Coordinator** - Introduction to the Department

12:45 **Chris Waltham, Undergraduate Chair** 0

12:55 **Janis McKenna, 2nd-4th Year Advisor** 1

13:00 **Vesna Sossi, Biophysics Program Chair** 2

13:05 **Ingrid Stairs, Astronomy Program Chair** 3

13:10 **Javed Iqbal, Science Coop Program Director** 4

Club activities

13:20 **Physsoc – Ella Meyer** 5

13:25 **Astronomy – Katie Rink** 6

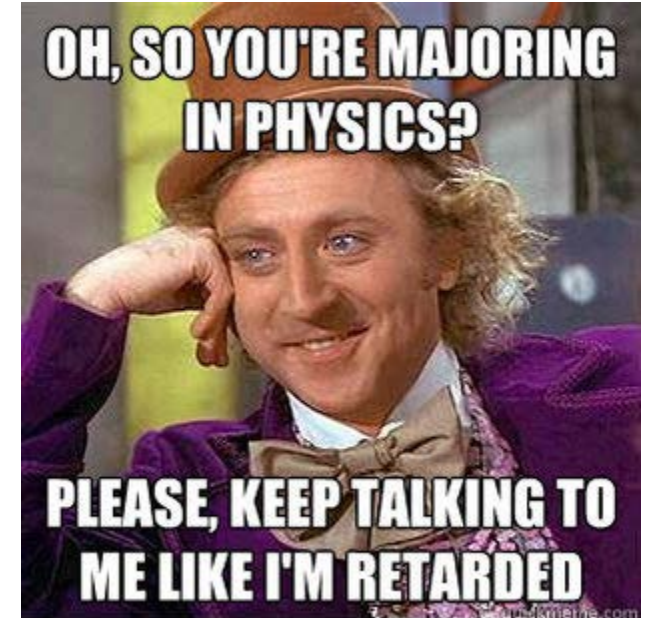
13:30 **Biophysics – Chantal Percival** 7

QUESTION Period

Physics is Hard

So why do it?

- Because you love it
- Because you want to know how things work
- Because you want to know how the Universe works
- Because it opens up a wide variety of career opportunities



What can you do with a physics degree?



What can you do with a physics degree?



Online Physics and Astronomy (PHAS) Graduate Survey

- 235 participants
- Most participants graduated in the last decade, with a few much earlier.
- Careers 30% PHAS, 40% PHAS-related, 30% unrelated to PHAS.
- Highest PHAS degree is a B.Sc. – 43%

Which aspects of your studies have been most relevant to your career?

More than 80% of respondents declared all of these as “Very Important” or “Important”:

- Assessing the value of information critically
- Learning on your own
- Speaking clearly/effectively
- Writing clearly/effectively
- Working with others
- Using computers
- Solving numerical problems
- Research experience
- Managing projects

UBC PHAS B.Sc grads in non-academic/teaching work

Administrators

- Program Administrator, Canadian Mental Health Association

Airline

- Pilot

Consultants

- Dubin Environmental
- ESRI Canada
- Self-employed

Contractors

- Invista Canada

Domestic

- Stay-at-home Dad

Directors

- JP Morgan
- Roadhouse Interactive - Director of Studio Development
- SunCentral Inc.

Financial

- RBC Capital Markets/ Senior Analyst

Health

- Consultant neuroradiologist, Edinburgh UK
- Medical Physicist at Alberta Health Services
- PEI Cancer Treatment Centre

Law

- Partner, McMillan LLP
- Barrister & Solicitor

Manager

- Technical project manager, D-Wave
- Business Development Lead at Abcellera, a UBC start-up

Military

- Pilot, RCAF
- Ottawa/Defence Scientist

Owner/President

- Owner of Murray Johnson Engineering Ltd.
- Equustek Solutions Inc. - President

Product Management

- Microsoft
- Mobile Health

Software/IT

- ShipConstructor Software Inc (SSI) - Victoria, BC
- D-Wave Systems
- Hootsuite
- MDA
- Solutions Architect, Blast Radius
- Vancity Credit Union

Technician

- TRIUMF/ATG Cyclotron Operator
- SFU Electronics Tech
- Osram

Last year's grads: where did they go?

Informal interviews with 23 out of ~ 60 at the May 2018 graduation. Of those who volunteered information about their next move:

- Combined major Physics/CompSci: 1qbit (two students)
- Combined honours Physics/CompSci: Google
- Combined major Physics/CompSci: Microsoft
- Honours Physics: IT
- Major physics/minor geophysics: exploration geophysics (not oil!)
- Major physics/minor economics: data science boot camp in Seattle, then Med. Tech.
- Biophysics: M.Sc. In bioinformatics
- Combined honours Physics/Math: Ph. D, Perimeter Insititute

In other words:

Data

Advice to the rising generation from ones who have “been there”:

- Do co-op (a constant theme in the responses).
- Don't just study. Get to know your professors and everyone else in the building. Networking is as important as any grades you get in class. Physicists are awesome, but not many people know how awesome. Make use of them. (Another constant theme in the responses).
- Join the Physics/Astro/Biophysics Society, and attend some of the Department seminars and colloquia. Join the Canadian Association of Physicists/CASCA, and attend the Canadian Undergraduate Physics Conferences if you can. (Another constant theme).
- Learn computer science and obtain research experience.
- Take next year's math this year.
- Don't be afraid to try something new, even if it makes you uncomfortable.
- Learn the scientific principles well. Solving problems by rote or memorization is a waste of time.
- Take ownership of your own education. Learning happens beyond lectures and labs.
- Learn to write effectively.
- Pay it forward; mentor younger folk.
- When you are deciding on your career path think very hard about what sort of work-life balance you wish for yourself.
- Do what interests you now.
- Have fun.

It won't all be smooth sailing - what to do if you have issues:

- With your course
 - Talk to your Prof.
 - If the Prof. cannot rectify - talk to the u/g chair, Chris Waltham (me)
- With the program
 - Administrative issues – talk to the u/g coordinator, Salena Li
 - Advising – talk to your program advisor (Profs. McKenna, Stairs, Sossi)
 - Academic issues – talk to the u/g chair, Chris Waltham (me)
- With life (health, finance, harassment, careers, anything...)
 - <https://students.ubc.ca/>
 - But also – talk to the person who is most likely to be of immediate help: your profs., advisors and u/g chair

Basic Python & Microcontroller Skills Workshop

**Never coded? Mystified by electrical circuits? Anxious about Second Year Physics Labs?
Try this no-credit, no-marks, low stress Basic Python & Microcontroller Skills Workshop**

April 29th – May 3rd, 2019. 1:30-4:30pm each afternoon @ Life 2532 on UBC Campus

This workshop is aimed primarily (but not solely) at students who aim to be going into 2nd-year physics in September, and would like to boost their confidence in laboratory and computing skills. The workshop is intended to be a not-for-credit primer for such courses as Phys210 (Computational Physics) and Phys219 (Experimental Physics). Fee: \$150 + GST.

Workshop goals (zero experience necessary):

- to get started with the Python language and control a microcontroller with Python
- to learn how to calibrate sensors and make/display/analyze measurements
- to debug an electrical circuit with an oscilloscope

Students will leave the workshop with Python running on their laptops, and each will have an Arduino Nano microcontroller, an ultrasound distance-measuring device, a breadboard and cables to take away. You will need to bring your own laptop to the workshop.

Registration is open: <https://phas.ubc.ca/undergrad-workshop-for-students>

Space Limited

2nd Year

In 2nd year, Physics/Astronomy specialists enter one of our Programs:

- ★ **Honours, Combined Honours “PHYS + other”**
- ★ **Major Physics/Astronomy, Combined Major “PHYS + CPSC”**
- ★ **Combined Major in Science (3 specializations)**
- ★ **Dual Degree Program – BSc (Physics) & BEd (Secondary)**
 - BSc (Physics) & B Arts
 - BSc (Physics) & B Music
- ★ **If in any other program: Minor in Physics / Minor in Astronomy**

+You can do co-op in any program in our department

Co-op: Get a two year head-start on your career, gain valuable experience, work in Canada and/or abroad, earn good pay.

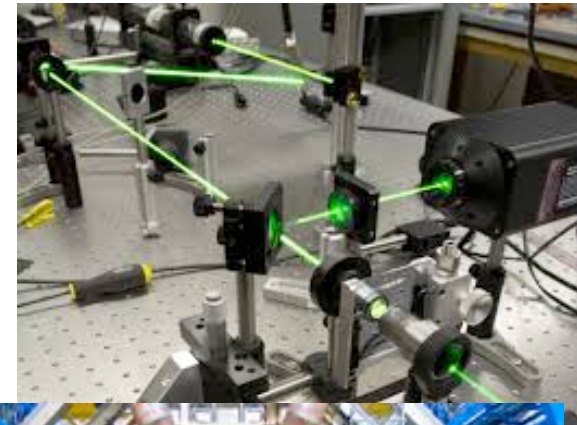
ubc science co-op



Honours

For students intending to enter career in research and/or continue to graduate school

- Honours Physics
- Honours Biophysics
- Honours Physics and Astronomy
- Honours Physics and Mathematics
- Honours Physics and Computer Science
- Honours Chemical Physics
- Honours Physics and another Science Subject



To remain in Honours: Take at least 30 credits each Sept-April or at least 15 credits per term if co-op- AND maintain average >68% AND fail no courses.

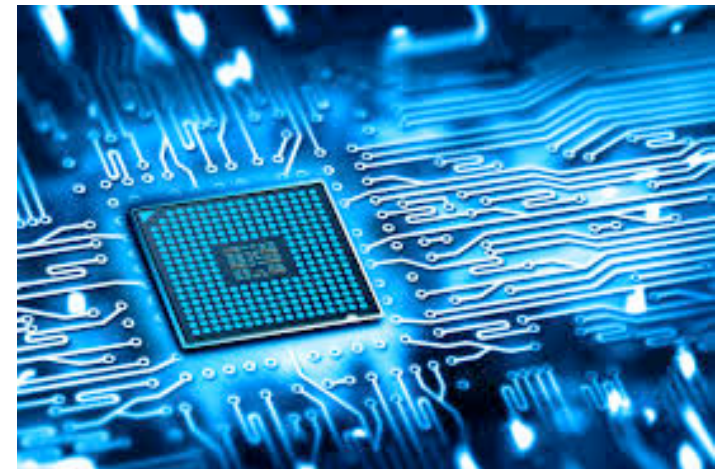
(didn't take 30 credits first year: will likely have to see a Science advisor to enter an Honours program – may not be accepted online → see a human)

We can help formulate a program which meets all honours requirements, Faculty Science requirements, & UBC graduation requirements

Major

- ★ For those intending to enter career in science/technology, education, science-related.
- ★ Major **IS NOT** the recommended stream for graduate studies (although some Majors who take all the core senior honours physics courses may get accepted to graduate schools.)
- ★ Offers more flexibility than Honours (fewer specified courses, more electives)
- ★ Easy to add a Minor to a Major (or Combined Major)

- Major Physics
- Major Astronomy
- Combined Major Physics and Computer Science
- Double Major in Science and/or Arts



Dual Degree

- ★ For those intending to add a second specialization outside of Science.
- ★ NOT the recommended stream for graduate studies, although students who take all core senior honours physics courses are often accepted to graduate schools.
- Dual Degree Science and Arts **BSc(Physics) & BA**
- Dual Degree Science and Music **BSc(Physics) & BMus**
- Dual Degree Science and Education
5 year program:
Dual Degree Program: BSc(Physics) BEd (Secondary)
Graduate ready to accept teaching position

Minor (for those in Physics/Astronomy)

- ★ If you're in any Physics or Astronomy Program: you may pick up a second specialization as a Minor
- ★ Easy to add a **Minor outside Physics/Astronomy** to Major Physics, Major Astronomy, or Honours Physics
- ★ Not a lot of “elective room” to add a minor to combined honours or combined majors program, but possible with careful planning.
 - **Minor in another Science**
 - **Minor in any Arts subject (Economics, Philosophy, a language are often seen, but any Arts minor possible)**
 - **Minor in Commerce**
 - **Minor in Human Kinetics**
 - **Minor in Land and Food Systems**

Typically need 18 upper level (300- 400-level) credits – **See Calendar for specific Minors requirements in specific subject**

Graduation Requirements

You are responsible for knowing your graduation requirements. Consult [UBC Calendar](#) and [Faculty of Science](#) online:

www.calendar.ubc.ca ← **ESSENTIAL REFERENCE**

- under “**Faculties, Colleges and Schools**” choose “**Science**” then “**Bachelor Science**” for all graduation requirements for any Science program (or “**Bachelor Arts**” for any Arts program)
Program specifics: continue and click “**Physics**” or “**Astronomy**”

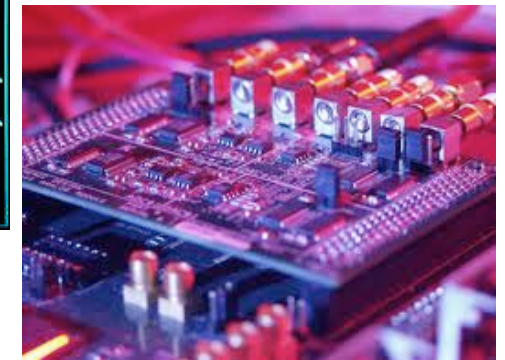
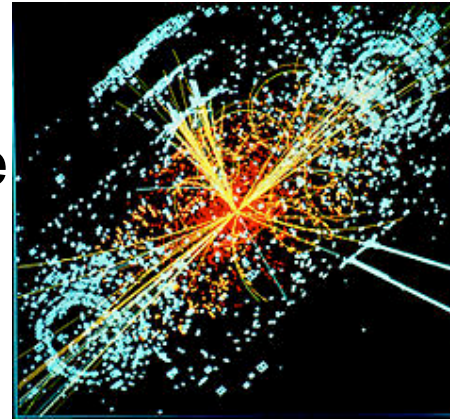
All requirements for any Honours, Major, Minor program in any Faculty at UBC are specified in the **UBC Calendar**

Also see our **Physics Undergrad Program Webpages:**
<http://www.phas.ubc.ca/undergrad-degree-programs>
<http://www.phas.ubc.ca/undergrad-students>

Research Opportunities for PHAS undergrads

UBC PHAS undergraduates participate in many different types of undergraduate research.

You must be pro-active, look into the different programs and opportunities and meet application deadlines.



The rewards are tremendous:

- Research experience
- Pay – I'm only mentioning paid research opportunities – you can also find opportunities to volunteer without pay (I DO NOT recommend them)
- Practical work/job experience
- Travel/cultural experience

Questions/need more info: Janis McKenna janis@physics.ubc.ca

Research Opportunities for PHAS undergrads

UBC PHAS undergraduates have participated in paid research, including:

- **NSERC USRA** (Undergrad Student Research Award)
- **Co-op** <http://www.sciencecoop.ubc.ca/prospective> (4-, 8-, or 12- month co-op jobs)
- **TRIUMF** Summer student program (and year-round 4-, 8- or 12-month co-op jobs)
<http://www.triumf.ca/home/employment-opportunities/undergraduate-students/undergraduate-student-jobs>
- **NRC** (National Research Council Canada)
http://www.nrc-cnrc.gc.ca/eng/careers/programs/student_employment.html
- **DAAD RISE** (German Research Internships in Science & Engineering)
<https://www.daad.de/rise/en/> UBC is a DAAD partner
- **UBC Go Global - Research Abroad**
<http://students.ubc.ca/career/international-experiences/research-abroad>
Also: Go Global has other international experiences <http://students.ubc.ca/career/international-experiences>
- **UBC Science Opportunities (SURE, WorkLearn, USRA + others):**
<http://science.ubc.ca/students/resources/research>
- **IAESTE** (International Association for the Exchange of Students for Technical Experience (Canadian office: <http://iaestecanada.org/>)
- **UBC Careers and Work Learn Program**- max 10 hours/week while fulltime student <http://students.ubc.ca/career/campus-experiences/work-learn>
- And there are many other opportunities you may find on your own. If you are a citizen of another country, look up programs in your home country too.

Can I do research before 4th year?

Yes! Every summer **UBC PHAS** and **just about every other Canadian Physics/Astronomy dept** offer the **NSERC USRA** program –

For summer 2020: get ready and read up on deadlines in December 2019. Most universities have application deadlines in December or early January.

Many faculty hire students for summer and/or co-op terms.

I recommend going to another university for a USRA.

(not UBC-Vancouver)

BONUS: the USRA program also pays your airfare to/from the other university.



NSERC USRA

(Undergraduate Student Research Awards)

- Must be Canadian citizen or permanent resident completing 2nd year or higher of undergraduate degree.
- Cumulative average of AT LEAST B+ in previous years university
- Competitive: each university has a finite number; most awardees will have A averages, excellent application/proposal, great references.
- Most Physics departments have deadlines in December or January.
- Decisions/awards made in late January or February
- 12-16 weeks paid work in a research group at a Canadian university
- Award includes travel to and from current university to work location

Details at: http://www.nserc-crsng.gc.ca/students-etudiants/ug-pc/usra-brpc_eng.asp
and <http://www.phas.ubc.ca/undergraduate-nserc-usra>

Most university Physics/Astronomy Departments will have their own USRA website/info up early in the fall term. If you want to go to a specific university for a USRA and don't see info online, email the undergraduate Program advisor or assistant before Christmas.

If no reply within a week, follow up by phoning – you may have the wrong person.

Pay must be at least \$5625 for 4 months, but is typically \$6,000-\$8,000 for 4 months.



UBC Co-op

Dr. Javed Iqbal
will give details



My (humble?) opinion:

Co-op is **Best Program** for work and research opportunities

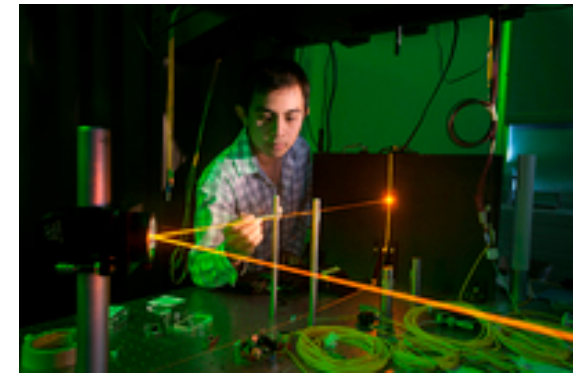
(Disclosure: I was a co-op myself in undergrad, as were a number of UBC faculty members)

- 20 months of research and work experience before graduation
- You can participate in ANY of the previously mentioned research programs as a co-op work term with an OK from coop office.
- Graduate with lower debt/ no student loans (graduate with RRSP started)
- Excellent preparation & experience for easy entrance into job market
- Excellent preparation and experience for graduate school
(in theoretical or experimental research)

PHYS 449 Thesis, PHYS 349B mini-thesis

Your chance to conduct your own research project
At end of 3rd year, start talking to faculty about
research opportunities

Honours students: PHYS 449/ASTR 449:
full year 6-credit thesis.
Mandatory for all Honours students



Majors students: PHYS 349: smaller scale, full-year
3-credit directed studies/research project.
(optional elective, run together with PHYS 449)



PHYS 449 Thesis, PHYS 349B Mini-Thesis

Discuss your ideas/interests with potential supervisors.

Many potential supervisors: faculty members, including adjunct professors whose research is based off campus.

Supervisors don't have to be UBC PHAS affiliated at all, but you'll need a PHAS co-supervisor if supervisor non-UBC

Send email, knock on doors,

Self-motivated:

- You'll work with advisor & PHYS 449/PHYS 349 instructor as your guides/mentors.
- You'll learn how to conduct research, write it up & give scientific presentations.
- Your thesis project is your own work.

Research – your opportunity

Examine your interests, seek opportunities

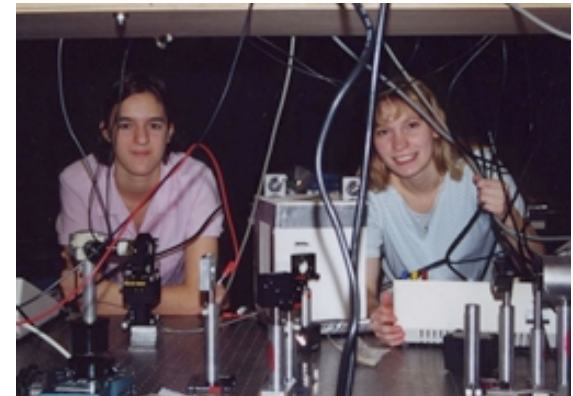
Talk to senior undergrads about their research experiences
(meet them via PHYSSOC activities or in PHYSSOC lounge)

Research happens not only in academic institutions, but also government labs, high-tech industry and private companies.

Experience in computing/programming/design is a huge asset, whether seeking a job or seeking a graduate school position.

Ditto for technical experience.

I strongly recommend trying different opportunities, both inside and outside of university setting.

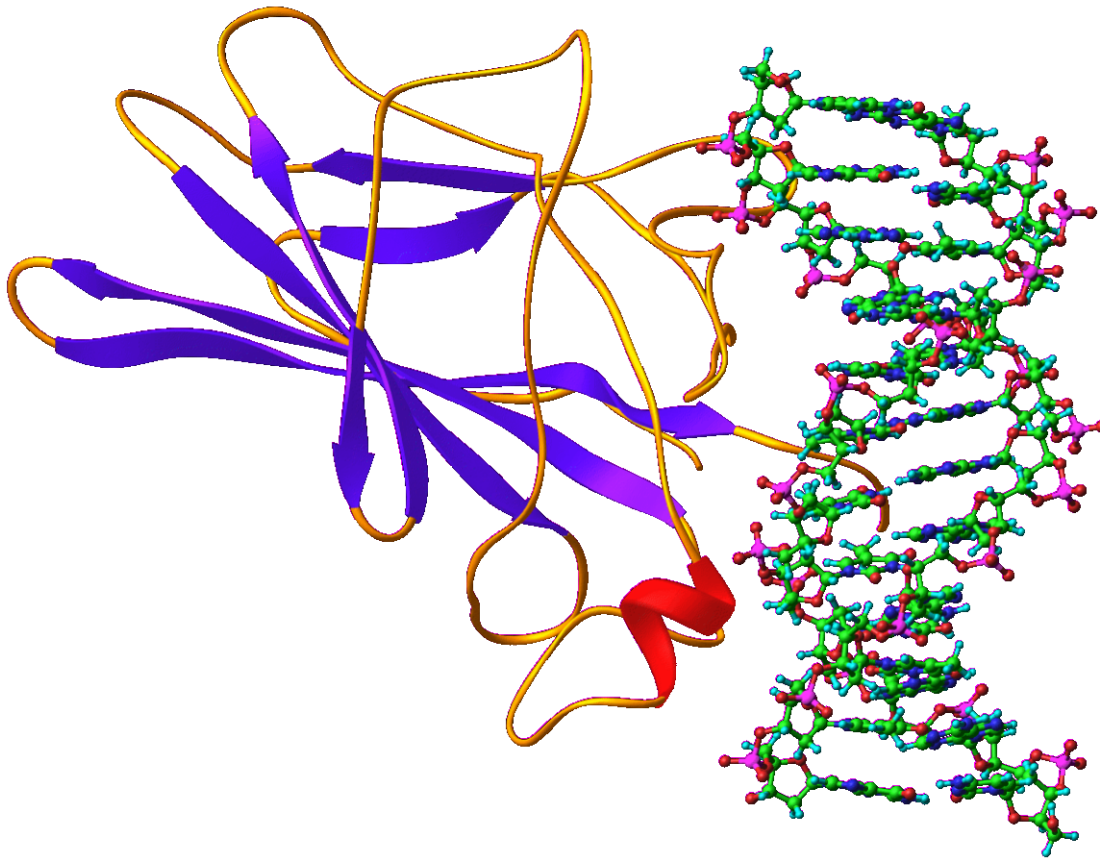


Honours biophysics program



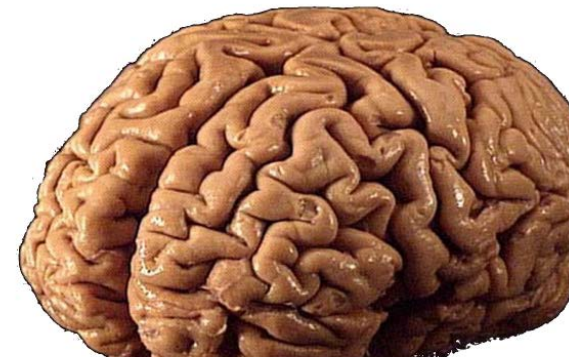
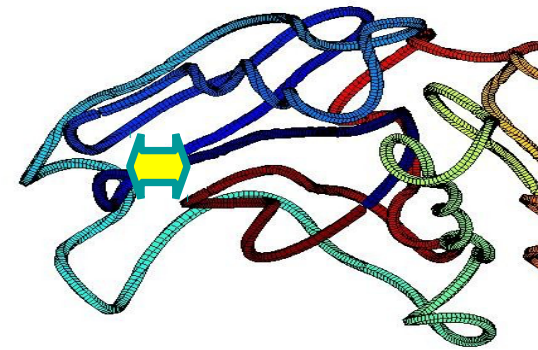
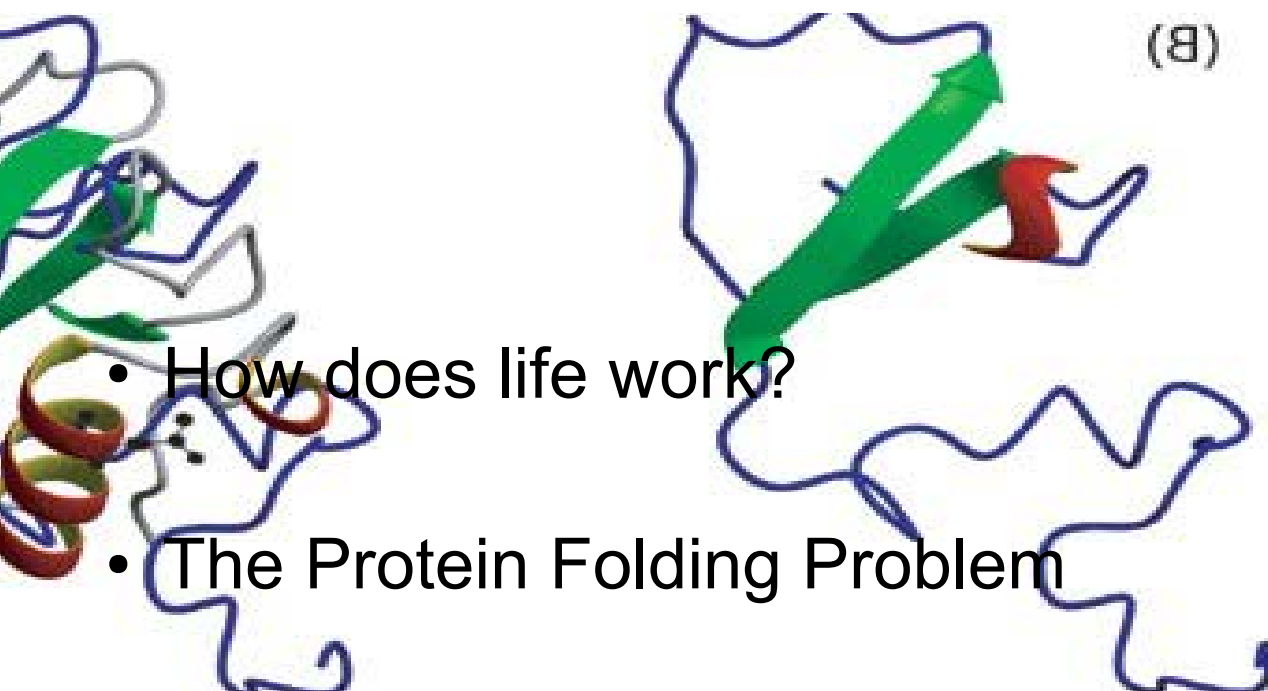
What is Biophysics?

an interdisciplinary science that applies the theories and methods of physics to questions of biology.



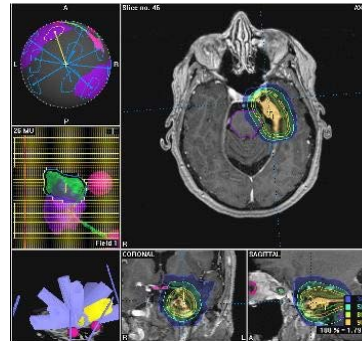
estions

- How does life work?
- The Protein Folding Problem
- (How) Has biology exploited quantum mechanics to tailor biological function?
- Neurobiology: what is the brain? How do we learn? Neuroplasticity?

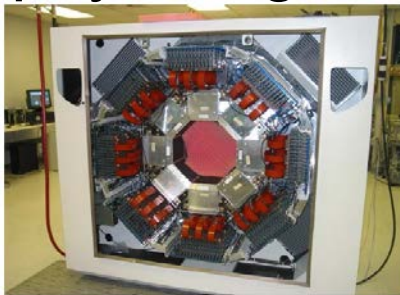


Medical Physics

- Therapy: how can we find the optimal way to kill cancer cells while leaving other tissue unscathed?



- Imaging: Can we create a basis for personalized medicine with quantitative measurements of physiological parameters?

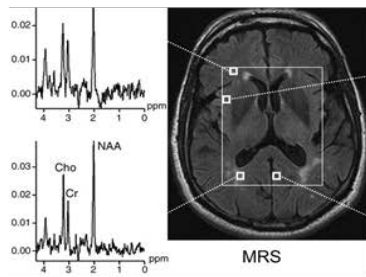
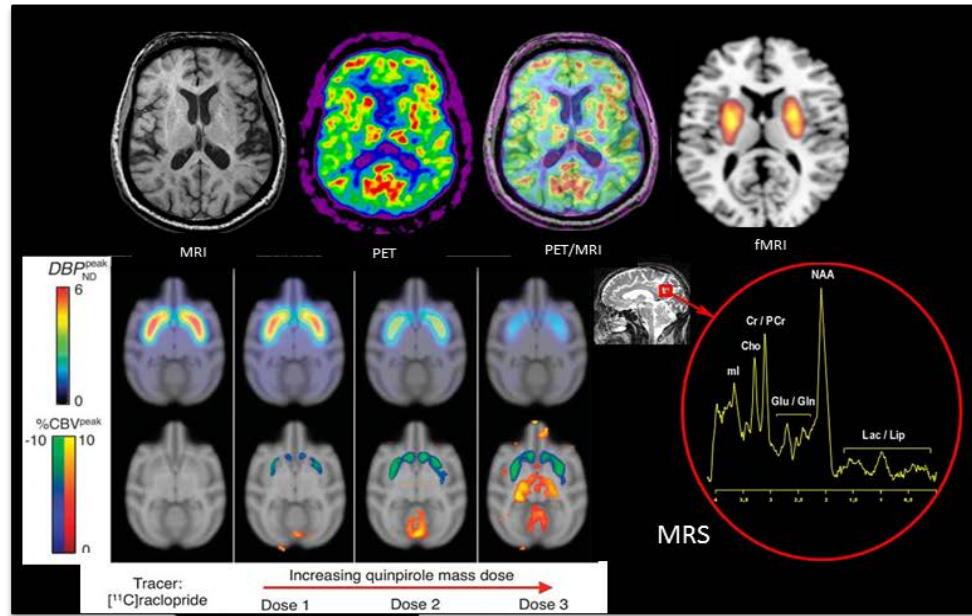


- Can we understand how the brain works?

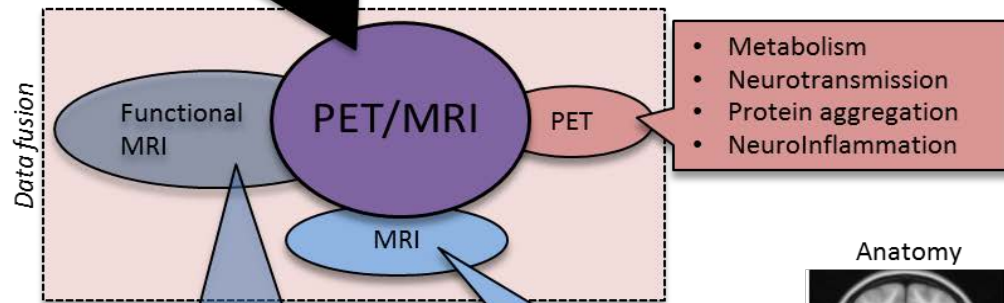
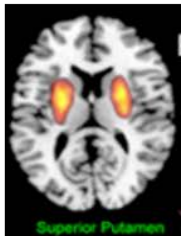
New Neuroimaging Suite at the DMCBH at UBC

Hybrid PET/MRI

MRI; 1st GE PET/MRI in Canada

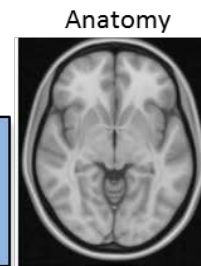


Functional networks

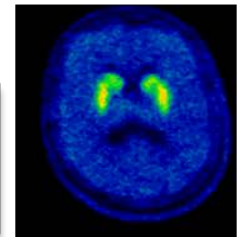


- Hemodynamics
- Functional networks
- (rs)-fMRI
- Magnetic Resonance Spectroscopy (MRS)

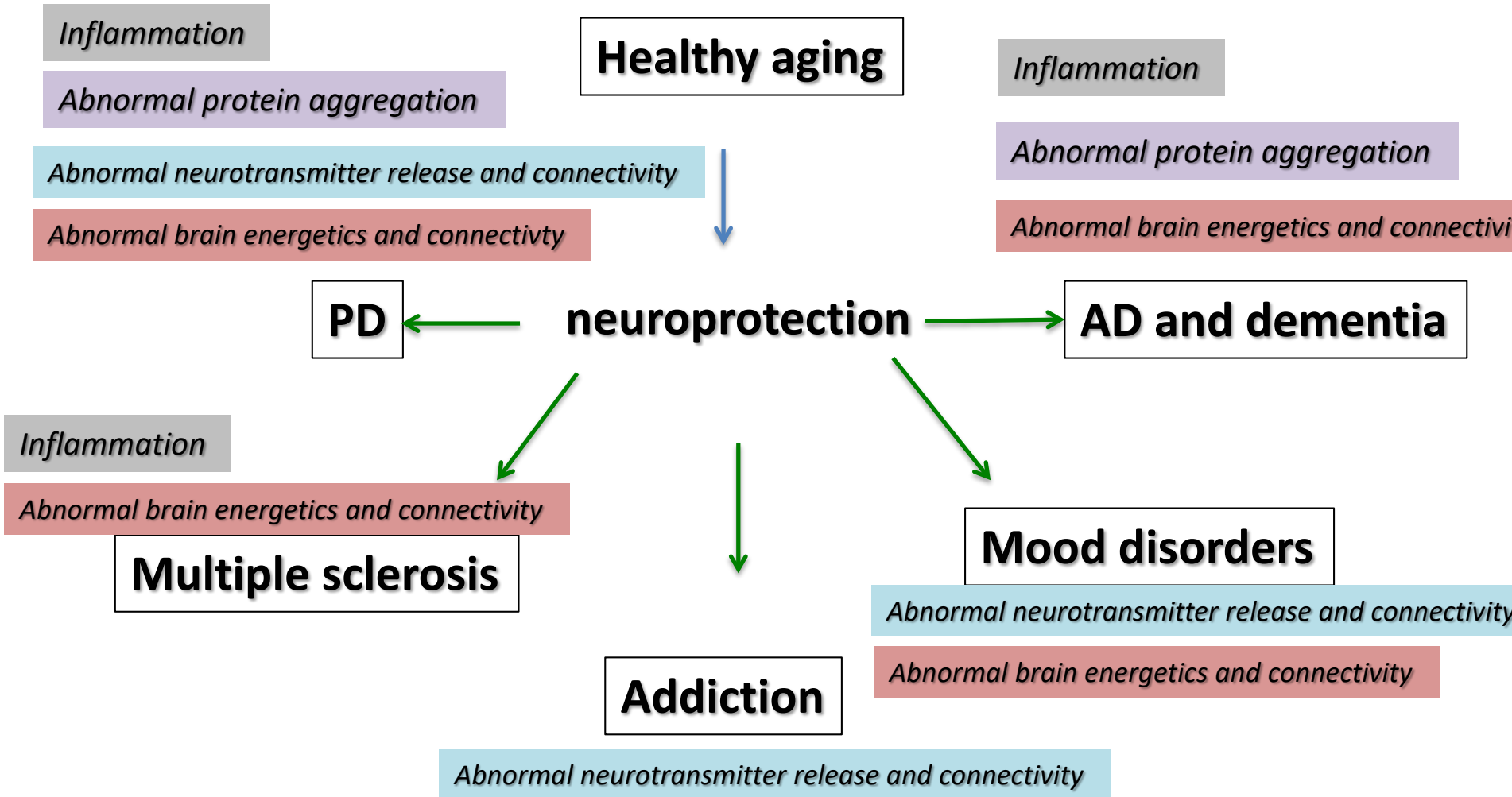
- Anatomical structures
- Structural connectivity



Neurochemistry



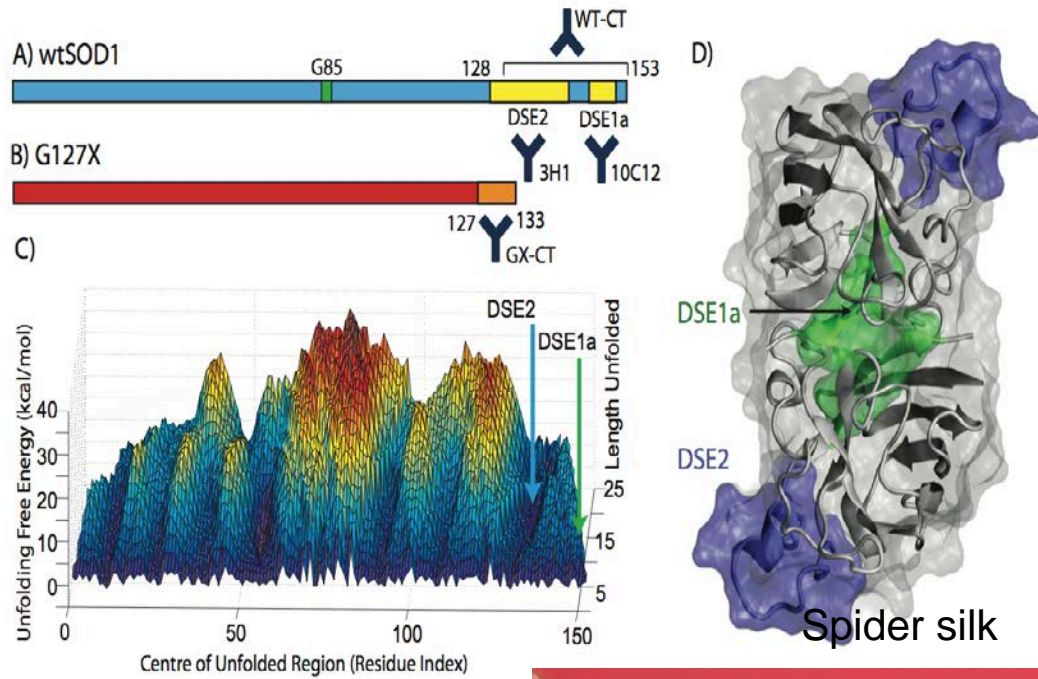
Synergy and cross-fertilization with other brain function research at UBC



+ Algorithms development

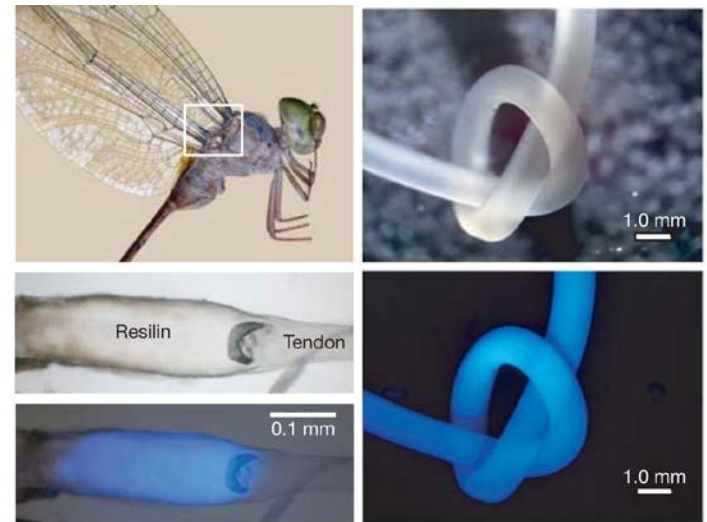
Plotkin group

Application of misfolding landscapes to predict disease-specific epitopes in SOD1



Carl Michal – NMR of biological materials

Resilin



What do Biophysics Program graduates do after graduation?

Most continue their education:

- Graduate School:

- Biophysics
- Mechanical Engineering(orthopaedics)
- **Medical Physics**
- Pathology
- Biochemistry
- Experimental Medicine
- Neuroscience
- Epidemiology
- Education

- **Medical School**

HOW

Year 1	Description	Credits
BIOL 112 ^{1,2} , 140	Ecology, Genetics and Evolution	5
PHYS 107, 108, 109 (or 117, 118, 119 or 101, 118, 119) ^{2,3}	Enriched Physics I, Enriched Physics II, and Enriched Experimental Physics	7
CHEM 121, 123 (111, 113) ²	Structural and General Chemistry	8
MATH 100, 101 (120, 121 or 102, 103 or 104, 105) ²	Differential and Integral Calculus	6
Communication Requirement ⁴		6
Elective ^{5,6,16}		1
Total Credits Year 1		33

Year 2	Description	Credits
BIOL 200	Cell Biology I Structural Basis	3
CHEM 233, 235	Organic Chemistry I	4
MATH 2177	Multivariable and vector calculus	4
MATH 223 (221)	Linear algebra	3
PHYS 2008	Relativity and Quanta	4
PHYS 219	Intermediate Experimental Physics I	2
BIOL 201	Cell Biology II: Intr. to Biochem.	3
MATH 215	Differential equations I	3
CHEM 205 (213) ⁹	Physical Chemistry	3
PHYS 203	Thermodynamics	4
PHYS 229	Intermediate Experimental Physics II	1
Total credits Year 2		34

Year 3	Description	Credits
BIOC 3029,10	Molecular Biochemistry	3
MATH 300	Introduction to Complex Variables	3
MATH 316	Elementary Differential Equations II	3
PHYS 301	Electricity and Magnetism	3
Electives ^{5,6,14,16}		3
PHYS 30511	Biophysics	3
PHYS 21611	Intermediate Mechanics	3
PHYS 31912	Laboratory	3
MATH 318	Probability with Physical Applications	3
Bio-science elective ^{11,13,14}		3
Electives ^{5,6,14,16}		3
Total Credits Year 3		33

Year 4	Description	Credits
PHYS 304	Quantum Mechanics	3
PHYS 44915	Honours thesis	6
Bio-science electives ¹³		15
Electives ^{5,14,16}		8
Total Credits Year 4		32

Total credits to graduate 132

Diverse!

Physics, Math, Chemistry, Biochemistry, Biology!

Second year entrance is regulated by the Faculty of Science

To **remain** in the biophysics honours program:

UBC Science requires:

1. complete all courses attempted (no failed courses)
2. complete a minimum of 30 credits per winter session (often more are needed)
3. maintain a minimum 68% average per academic session.

- Don't get behind at the start of term
- keep your eye on the add/drop deadlines
- A 'W' on your transcript is no big deal



Entrance in the 3rd year: s- II possible

At the discretion of PHAS Biophysics
and Undergraduate Advisors



Requirements:



- Average of at least $\sim 72\%$ in the second year
- Have never failed a course
- Have taken a minimum of 30 credits in the second year
- Course content appropriate for the biophysics program

These are minimum requirements – applications will be considered on a case by case basis.

Recommendations:

Follow as closely as possible the program outlined for the Honours Biophysics program in the second year. Some missed courses can be taken in summer.

<http://www.phas.ubc.ca/undergrad-honours-biophysics>

Come and talk to the Program Advisors



Support is available:

- Biophysics is a small program, and traditionally very close-knit.
The Biophysics students' society can help:
 - get to know older students who've been through it before
 - help with studying
 - social activities
- Departmental advisors and course instructors
- Science advising centre
- Science support programs: <http://my.science.ubc.ca>

Any other questions:
please e-mail the program advisor: vesna@phas.ubc.ca
(phone 822 7710)

Astronomy specializations at UBC

Astronomy Major

Career options include: technical support personnel at international observatories, astronomy educators, and outreach experts at science centres and planetaria. The diverse skills acquired in this specialization are attractive to non-academic employers.

Astronomy specializations at UBC

Astronomy Major

Career options include: technical support personnel at international observatories, astronomy educators, and outreach experts at science centres and planetaria. The diverse skills acquired in this specialization are attractive to non-academic employers.

Combined Honours Physics and Astronomy

Intended for students who want to go on to graduate studies in Astronomy and Astrophysics (or other areas of Physics, depending on upper-level electives). A Ph.D. is generally a requirement to be a scientist at a research institute or observatory, or to be a professor at a university.

Also available: Co-op, Minor, CMS

Astronomy courses at UBC

ASTR 101	Intro. to the Solar System		
ASTR 102	Stars, galaxies, cosmology		
ASTR 200	Frontiers of Astrophysics	Maj	Hon
ASTR 205	Stars and Stellar Populations	Maj	Hon
ASTR 303	Galaxies	Maj	Hon
ASTR 333	Exoplanets and Astrobiology		
ASTR 403	Cosmology		
ASTR 404	Astronomical & Astrophysical Measurements	Maj	Hon
ASTR 405	Astronomical Laboratory	Maj	Hon
ASTR 406	High-Energy Astrophysics	}Maj	Hon
ASTR 407	Planetary Science		
ASTR 449	Directed Research in Astronomy		Hon

Astronomy courses at UBC

ASTR 101	Intro. to the Solar System	Useful background but not required		
ASTR 102	Stars, galaxies, cosmology			
ASTR 200	Frontiers of Astrophysics	Start of specializations		
ASTR 205	Stars and Stellar Populations			
ASTR 303	Galaxies		Maj	Hon
ASTR 333	Exoplanets and Astrobiology			
ASTR 403	Cosmology			
ASTR 404	Astronomical & Astrophysical Measurements		Maj	Hon
ASTR 405	Astronomical Laboratory		Maj	Hon
ASTR 406	High-Energy Astrophysics		}Maj	Hon
ASTR 407	Planetary Science			
ASTR 449	Directed Research in Astronomy			Hon

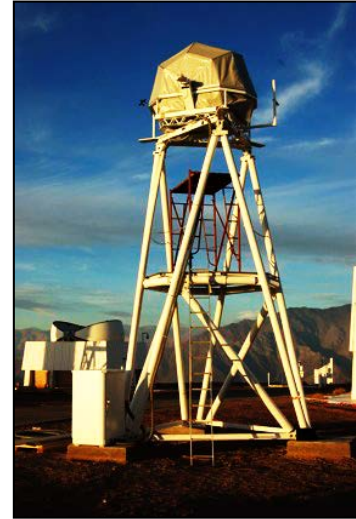
Astronomy opportunities at UBC

ASTR
405 lab
course

- Small, remotely-controlled optical telescope in Chile for undergraduate training and research
- Once Hebb is renovated, the Small Radio Telescope will be reinstalled on the roof for undergraduate teaching

ASTR 449,
NSERC
USRA,
other
research
programs

- Lots of opportunities to get involved in research using many different telescopes: CHIME, Arecibo, Green Bank, CFHT, Gemini, Hubble, Most, Kepler, Chandra, LSST, eventually the Thirty Metre Telescope and the Square Kilometre Array... And of course there are theoretical and numerical opportunities, too!



Some telescopes you might use or help build



CHIME

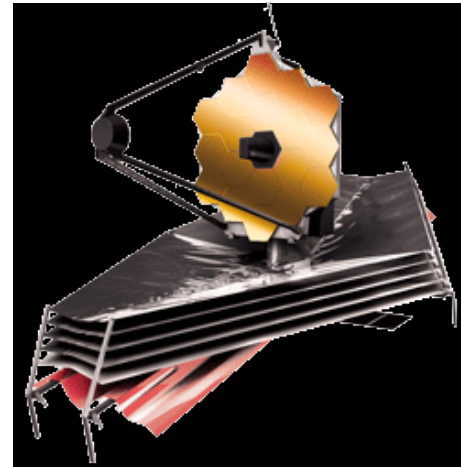


Arecibo



CFHT

TMT



JWST

Hubble
Space
Telescope



Astronomy Career Information

- http://casca.ca/?page_id=93
- <https://aas.org/learn/careers-astronomy>
- www.ras.org.uk/images/stories/ras_pdfs/careers_v12.pdf

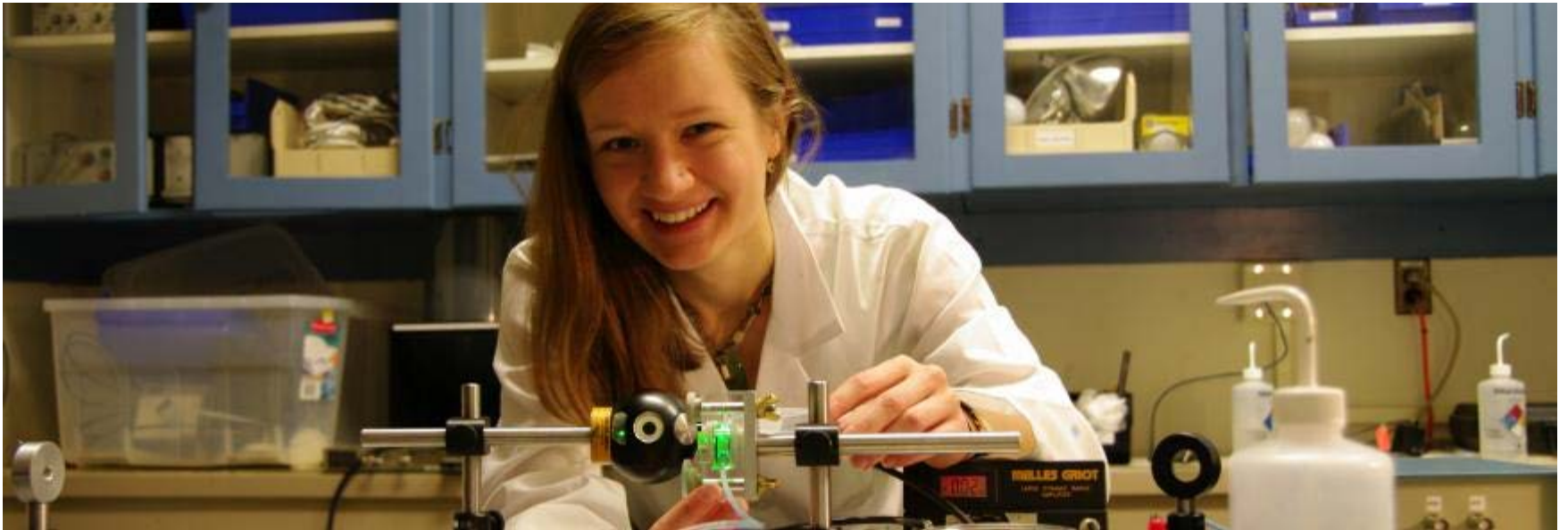
Astronomy Advising

Prof. Ingrid Stairs

Hennings 332

ug-astr@phas.ubc.ca

UBC Science Co-op



Javed Iqbal iqbal@phas.ubc.ca

www.sciencecoop.ubc.ca

Science Co-op Programs

Atmospheric Science	Biochemistry	Biophysics	Biopsychology	Biotechnology
Chemistry	Cognitive Systems	Computer Science	Earth & Ocean Sciences	Engineering Physics
Environmental Sciences	General Sciences	Integrated Sciences	Land & Food Systems	Mathematics
Microbiology	Pharmacology	Physics & Astronomy	Statistics (Undergrad & Grad)	And more...

What is Co-op?

- Integration of academic studies with **relevant, paid, supervised** and **productive** work experience
- Co-op students gain skills and experience which prepare them for the future job market, graduate studies and give them improved employment opportunities upon graduation

Average monthly salary for Physics/Astronomy Co-op: \$2500

PHYS/ASTR Schedule - A

Year	Term1	Term 2	Summer
1	ST 1	ST 2/apply	
2	ST 3	WT1	WT2
3	ST 4	ST5	WT 3
4	WT4	ST 7	WT 5
5	ST 7	ST 8	

Phys/Astr & BIOP Schedule

Year	Term1	Term 2	Summer
1	ST 1	ST 2	
2	ST 3	ST 4	
3	ST 5/apply	ST 6	WT 1
4	WT 2	WT 3	WT 4
5	ST 7	ST 8	

Benefits of Co-op

- Practical experience
- Work on real life problems
- Networking
- Increased job prospects after graduation
- Life skills

Where did the PHAS Co-op students worked the past summer?

- Ballard Power Systems
- Environment Canada
- E-One Moli Energy
- Eastside Games
- Canadian Space Agency
- ETH Zurich (Switzerland)
- Genome Institute of Singapore
- Honda Research Institute (Japan)
- King Abdullah University (Saudi Arabia)
- Laser Zentrum Hannover (Germany)
- Max Planck Institutes (Germany)
- Musqueam Indian Bands
- Ecole Polytechnique de Federale Lausanne (France)
- Sony Pictures Imageworks
- Safe Software
- Triumph
- UBC (PHAS, CHEM, EOS)
- University of Wurzburg (Germany)
- University of Tokyo (Japan)
- Thought Exchange

Where did the BIOP Co-op students work this Summer?

- International Collaboration on Repair Discoveries
- MPI for the Science of Light (**Germany**)
- Genome Institute of Singapore (**Singapore**)
- Robert Bosch (**Germany**)
- Laser Zentrum Hannover (**Germany**)
- UBC Michael Smith Lab
- UBC (Physics and Astronomy)
- UBC (Psychiatry)
- University of Montreal
- University of Wuerzburg (**Germany**)

Program Fees

- Co-op workshop fee: \$ 251.75
- Co-op work term fee: \$ 774.75 per WT
- Total cost of program: \$ 3,200

Application Criteria

- Must have a minimum “B” average
- Willingness to work anywhere in Canada
- Positive attitude. Keen interest in chosen field.
- Each candidate is interviewed to assess their suitability to the program.

Upcoming Application Deadlines

Program:	Application Deadlines
PHYS/ASTR (1 st year students)	March 1, 2019
PHYS/ASTR (2nd or 3rd Yr.) BIOP (3rd Yr.)	Sept. 30, 2019

Apply online at

<https://sciencecoop.ubc.ca/prospective/applydeadlines>

The UBC Astronomy Club

Explore the universe with us.

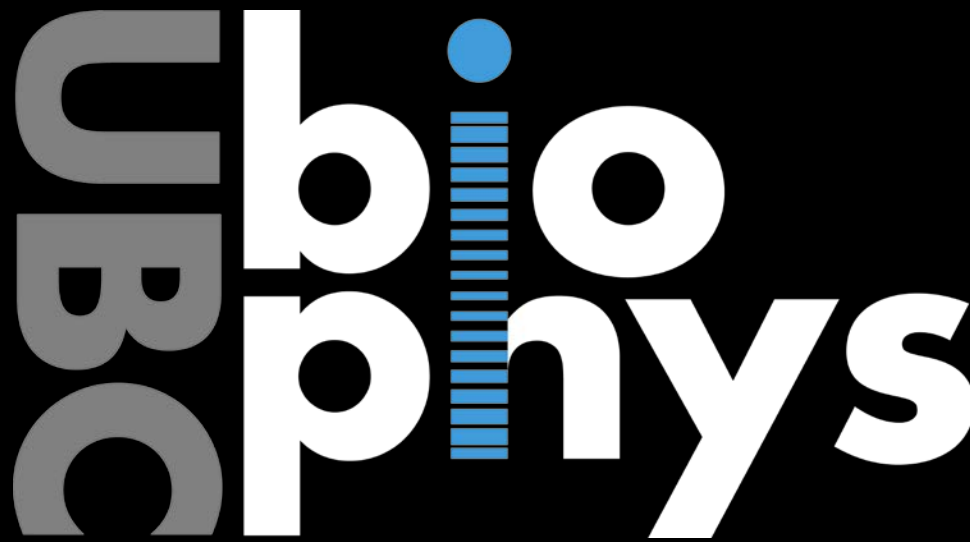
We do:

- Stargazing trips
 - Trivia nights
 - Social events
 - Lectures
- (No background required)

We welcome everyone, regardless of how much you know about space!

Follow us at facebook.com/UBCAstronomyClub to find out about upcoming Porteau Cove trips, flash observations, and other great events

This photo taken by Mark Andruk at a Porteau Cove event



Social and Academic Support

Meet & Greet

Mentorship Program

Facebook: UBC Biophysics Student Society

Email: bpss.exec@gmail.com