Department of Physics Orientation
For returning students

Part One: Student Advising (Mr. Matthew Storms)
Break: Group Discussion on Career Development
Part Two: Developing Your Career (Dr. Laszlo Kalman)
Part Three: CUBCAPS Presentation (Arielle Dascal, Christian Palmer)
Afterwards: Colloquium and Department Get-Together
Student Advising

Outline

• People you should know
• Spaces in the Dept. of Physics
• Dept. of Physics Programs
  • Important reminders
• Policies of the University and the department
• Resources for students
• BSc program information
  • Your course sequence: important reminders
• Get in touch early and often
People to Know in the Department

- Matthew Storms (BSc Coordinator and Advisor)
  - Office: SP-367.01 (matthew.storms@concordia.ca)
- Marie-Anne Cheong Youne (Undergraduate Program Assistant - Assistant to the Chair)
  - Office: SP-365.02 (marieanne.cheongyoune@concordia.ca)
- Patrick Doane (Teaching Labs Coordinator)
  - Office: SP 265.01 (patrick.doane@concordia.ca)
- Dr. Alexandre Champagne (Department Chair)
  - Office: SP-367.03 (A.Champagne@concordia.ca)
- Dr. Laszlo Kalman (Undergraduate and Co-op Program Director)
  - Office: SP-365.10 (laszlo.kalman@concordia.ca)
- Dr. Pablo Bianucci (Undergraduate Teaching Labs Director)
  - Office: SP-367.21 (pablo.bianucci@concordia.ca)
B.Sc. Degree Programs (90 credits)

- Minor in Biophysics (24 credits)
- Major Physics (45 credits + electives/minor)
- Specialization in Physics (66 credits + electives/minor + 1 semester research project)
- Specialization in Biophysics (66 credits + electives/minor + 1 semester research project)
- Honours – Physics/Biophysics, GPA > 3.3 (69 credits + electives/minor + 2 semesters research project)
- Co-op program (combine with any of the above)
- Extended Credit Program (+30 basic credits if coming from another province or from abroad)
B.Sc. Degree Programs

1. Master theoretical (bio)physics
   - Year 1: Physics: An Introduction
     Mechanics, Mathematical Theory, Electricity
   - Year 2: Principles of Natural Science
     Quantum Theory, Thermodynamics, Magnetism
   - Year 3: Modern Directions in Physics
     Transistors, MRIs, Lasers, Photosynthesis

2. Plan, execute, and analyse robust experiments
   - Year 1: Principles of Experimental Physics
     Error Analysis, Scientific Reporting
   - Year 2: Experimental Design
     Automated Data Collection, Modelling Results
   - Year 3: Real Research
     For-credit Research in a Lab in the Department!

3. Develop computational skills
   - Year 1: Numerical Analysis
     Solve Equations/Problems with a Computer
   - Year 2: Interfacing Experiments
     Remotely Control Instrumentation
   - Year 3: Computational Physics
     Neural Networks, Data Analysis, Monte Carlo
Co-Op Program
Combining study with work experience

- Three paid work terms as part of your degree
- Training in CV writing and job application
- Must be a full time student (>12 credits/term)
- GPA > 2.8
- Contact Dr. Laszlo Kalman for details
- Visit the website of Institute for Co-operative Education:

https://www.concordia.ca/academics/co-op.html
Policies and Regulations

- Academic Integrity (Plagiarism: Don’t do It)
- Physics Diversity and Inclusion Statement
  - Groups and Resources
- Intellectual Property
- Academic Regulations
- Physics BSc Program Information
Academic Integrity

Concordia University places the principle of academic integrity, that is, honesty, responsibility and fairness in all aspects of academic life, as one of its highest values.

http://www.concordia.ca/students/academic-integrity.html

The most common offense under the Academic Code of Conduct is plagiarism, which the Code defines as “the presentation of the work of another person as one’s own or without proper acknowledgement.” It also includes for example the work of a fellow student, an answer on a quiz, data for a lab report, a paper or assignment completed by another student.

Examples for proper ethical behavior:

- If you complete a homework with someone else, write it down.
- If you use a reference, mention it in your work.
- Be honest on exams
Diversity and Inclusion

Our Department of Physics at Concordia University is a rapidly diversifying environment. We embrace this diversity by a firm commitment to inclusiveness. Everyone who dedicates their time and passion to physics belongs here and deserves to feel equally valued and respected no matter their gender, sexual orientation, ethnicity, religion, age, or disability.
Diversity and Inclusion

Groups and Resources

- Concordia Student Union / CUBCAPS
- Counselling & Psychological Services
- Women in Physics Canada
- Queer Concordia
- Aboriginal Student Resource Centre
- Multi-Faith and Spirituality Centre
- Access Centre for Students with Disabilities
Online lectures, course notes, and video recordings of classes are the intellectual property of the faculty member. They may not be distributed, published or broadcast without the permission of the faculty member. Students are also forbidden to use their own means of recording any elements of a class or lecture without permission of the instructor. The same applies to similar type of former work done by a fellow student.
Academic Regulations

Where do I find info about all of the University administrative procedures?

• Consult the Undergraduate Calendar
  http://www.concordia.ca/academics/undergraduate/calendar/current.html

• Be aware of important Undergraduate Academic Dates
  https://www.concordia.ca/students/undergraduate/undergraduate-academic-dates.html

• Talk to your Academic Advisor

  Matthew Storms (Office: SP-367.01, Ext: 5167)
  BSc Program Coordinator & Student Advisor
  matthew.storms@concordia.ca

Want to know more about the department?
Unsure which classes you should take?
Wondering which professor studies what?
Looking for help with a project?
Have a special request? Want to study abroad?
B.Sc. Degree Program Information

Visit the Department of Physics website!

- Major Physics to Specialization (Physics/Biophysics)?
  - Send form from website to Matthew Storms (Advisor)
- Specialization to Honours?
  - Speak to Matthew Storms.
- Starting your Research Project the Semester?
  - Register as soon as possible
  - Submit completed (signed!) form from website to:
    Dr. Laszlo Kalman (UPD)

*before the DNE deadline…*
## Course Sequences
### Major Physics

<table>
<thead>
<tr>
<th>YEAR 1: 21 PROGRAM CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FALL</td>
</tr>
<tr>
<td>MAST 218</td>
</tr>
<tr>
<td>Multivariable Calculus I</td>
</tr>
<tr>
<td>PHYS 232</td>
</tr>
<tr>
<td>Methods of Theoretical Physics I</td>
</tr>
<tr>
<td>PHYS 245</td>
</tr>
<tr>
<td>Classical Mechanics</td>
</tr>
<tr>
<td>General Education (3 credits outside physics)</td>
</tr>
<tr>
<td>General Education (3 credits outside science)</td>
</tr>
<tr>
<td>General Education (3 credits outside science)</td>
</tr>
</tbody>
</table>
# Course Sequences

## Major Physics

<table>
<thead>
<tr>
<th>YEAR 1: 21 PROGRAM CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FALL</strong></td>
</tr>
<tr>
<td>MAST 218</td>
</tr>
<tr>
<td>Multivariable Calculus I</td>
</tr>
<tr>
<td>PHYS 232</td>
</tr>
<tr>
<td>Methods of Theoretical Physics I</td>
</tr>
<tr>
<td>PHYS 245</td>
</tr>
<tr>
<td>Classical Mechanics</td>
</tr>
<tr>
<td>General Education (3 credits outside physics)</td>
</tr>
<tr>
<td>General Education (3 credits outside science)</td>
</tr>
</tbody>
</table>

General Education (3 credits outside science)
Course Sequences
Major Physics

Don’t forget to take **electives**.
## Course Sequences
### Major Physics

- **Start thinking about next year now.**

<table>
<thead>
<tr>
<th>YEAR 3: 9 PROGRAM CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FALL</strong></td>
</tr>
<tr>
<td>3 PHYS credits</td>
</tr>
<tr>
<td>chosen with academic advisor</td>
</tr>
<tr>
<td>Elective (3 credits) Suggested:</td>
</tr>
<tr>
<td>PHYS 370 Nonlinear Dynamics, Fractals, Chaos</td>
</tr>
<tr>
<td>PHYS 440 Computational Methods and Simulations</td>
</tr>
<tr>
<td>Elective (3 credits) Suggested:</td>
</tr>
<tr>
<td>PHYS 460 Chemical Aspects of Biophysics</td>
</tr>
<tr>
<td>General Education (3 credits outside physics)</td>
</tr>
<tr>
<td>Elective (3 credits) Suggested:</td>
</tr>
<tr>
<td>PHYS 498 Advanced Topics in Physics</td>
</tr>
<tr>
<td>Topic: Quantum Optics and Photonics</td>
</tr>
<tr>
<td>General Education (3 credits outside physics)</td>
</tr>
</tbody>
</table>

- **Prereq:** PHYS 253
- **Prereqs:** PHYS 334, PHYS 377
Course Sequences
Specialization: Physics

<table>
<thead>
<tr>
<th>YEAR 2: 24 PROGRAM CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FALL</strong></td>
</tr>
<tr>
<td>PHYS 330</td>
</tr>
<tr>
<td>Experimental Physics II</td>
</tr>
<tr>
<td>PHYS 334</td>
</tr>
<tr>
<td>Thermodynamics</td>
</tr>
<tr>
<td>PHYS 355</td>
</tr>
<tr>
<td>Electronics</td>
</tr>
<tr>
<td>PHYS 377</td>
</tr>
<tr>
<td>Quantum Mechanics I</td>
</tr>
<tr>
<td>General Education (3 credits outside physics)</td>
</tr>
</tbody>
</table>

- Don’t forget to take *electives*.
- Start thinking about next year *now*.
Course Sequences
Specialization: Physics

An example of what can go wrong.
Course Sequences
Specialization: Physics

An example of what can go wrong.

- **1st Winter:** I forgot PHYS 367
- **2nd Fall:** I can’t take PHYS 377
- PHYS 367 is a prerequisite
- **3rd Fall:** I don’t take PHYS 459
- I want to finish 377 coreq. first
- **4th Winter:** I can’t take PHYS 468
- I have to take it in the 5th Winter
- My graduation is delayed 1 year
- :'( :'( :'(
Course Sequences
Specialization: Biophysics

<table>
<thead>
<tr>
<th>FALL</th>
<th>WINTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 230 Experimental Physics I</td>
<td>PHYS 252 Optics</td>
</tr>
<tr>
<td>PHYS 253 Electricity and Magnetism I</td>
<td>PHYS 335 Methods of Theoretical Physics II</td>
</tr>
<tr>
<td>PHYS 377 Quantum Mechanics I</td>
<td>PHYS 354 Electricity and Magnetism II</td>
</tr>
<tr>
<td>PHYS 334 Thermodynamics</td>
<td>PHYS 330 Experimental Physics II</td>
</tr>
<tr>
<td>General Education (3 credits outside physics)</td>
<td>General Education (3 credits outside physics)</td>
</tr>
</tbody>
</table>

- Don’t forget to take **electives**.
- Start thinking about next year **now**.
Contact me (Matthew Storms) ext: 5167
Advising: MTWR 10AM-11AM, 3PM-4PM
Zoom ID: 911 741 4138; Password: Montreal

For help
- Course sequence?
- Transfer credits?
- Struggling?
- Personal difficulties?

For a leg up
- Graduate earlier.
- Research opportunities.
- Career questions.
When to reach out?

- Become Familiar with the Academic Calendar

Important Dates:

- **September 21: Add/Drop deadline**
  If you want to take a class, you must enroll before this date! Exceptions do occur, but there is *no guarantee*. If you drop a class after this date, it will appear as a DISC on your transcript and you will not be refunded. Exceptions are *extremely rare* and require extensive documentation.

- **November 9th: DISC deadline**
  If you are enrolled in a class beyond this date, you **unable to drop** the class for a DISC. Exceptions do occur, but there is *no guarantee*. 
When to reach out?

- Become Familiar with the Academic Calendar

What does it mean?

- If you are on the waitlist for a class, you should follow the materials until September 21
  
  If you are enrolled from the waitlist but have not been following the lectures, you will have a hard time catching up.

- If you are uncertain whether you should take a class, you should reach out for advising before September 21
  
  You will not be able to take the class otherwise.
Tools for success

- Attend the department-offered tutorials
  - Register for the tutorials.
    - You do not have to attend every session.
  - Tutorials are supplementary to the course:
    - An opportunity to ask questions.
    - A chance to interact with your classmates.

- You best resource is your peers
  - Get in touch with each other
    - Moodle—use the online forum to discuss
    - Teams—free office 365 for all students!
    - CUBCAPS reps—Christian and Arielle
Jobs/Internships and Grad School

Group Exercise

- Join breakout rooms of three or four.
- On the google form, write down the following:
  - Research/Career opportunities which you know of
  - Proposed timeline for: Searching/Making a CV/Applying
  - Properties of a good CV/Cover Letter/Application
- Q: What info should be added to the Physics website
Jobs/Internships and Grad School

Group Exercise

(Have fun, this is to get to know each other)
https://forms.gle/Rv64qdm9MbvWt1fMA

- Join breakout rooms of three or four.
- On the google form, write down the following:
  - Research/Career opportunities which you know of
  - Proposed timeline for: Searching/Making a CV/Applying
  - Properties of a good CV/Cover Letter/Application
- Q: What info should be added to the Physics website
Department of Physics Orientation
For returning students

Part One: Student Advising (Mr. Matthew Storms)
Break: Group Discussion on Career Development

Part Two: Developing Your Career (Dr. Laszlo Kalman)

Part Three: CUBCAPS Presentation (Arielle Dascal, Christian Palmer)

Afterwards: Colloquium and Department Get-Together
Developing your career
Beyond the classroom

Outline

• Why is doing more than just taking classes useful?
• What can I do (for real)? Opportunities.
• How and when to prepare a good application?
Why do more than taking classes?

- It is fun – it fuels your passion for physics.
- Physics is a discipline, but often it is not a clearly defined career path.
- It takes time to find your path – do it during your BSc!
- Build a strong CV: every experience counts and will open doors.

E.g. (Summer research, Co-op internships, Volunteer research, Student projects/clubs).
Challenges outside the classroom

- Although there are many jobs for physics bachelor’s degree recipients, very few have the word “physics” in the title
  → How to search for positions?

- Hiring professionals may not understand what a physics student actually knows or is capable of doing
  → Build a strong CV (get experiences you can show!)

- Faculty may not understand what a physics student actually knows or is capable of doing outside of working in academia
  → Talk to many faculty, but also to Alumni and Students

- Students have difficulty articulating their strengths and capabilities (communication skills)
  → Develop “Soft skills” and team work.
How to search for positions?
Job titles for physics bachelor’s job seekers

- Core skill set: Critical thinking, Mathematics-based problem solving, data analysis
- Added value: Advanced instrumentation (labs), programming

- For some: go to Graduate School

IT and Teaching
- Computer Hardware & Software
- Analyst
- IT Consultant
- Programmer
- Software Engineer
- Systems Analyst
- Web Developer Education
- High School Physics Teacher
- High School Science Teacher

Engineering
- Application Engineer
- Associate Engineer
- Design Engineer
- Development Engineer
- Electrical Engineer
- Field Engineer
- General Engineer
- Laser Engineer
- Manufacturing Engineer
- Mechanical Engineer
- Optical Engineer
- Project Engineer
- Research Engineer
- Systems Engineer
- Test Engineer Research & Technical

Research
- Lab Assistant
- Lab Technician
- Physical Sciences Technician
- Research Assistant
- Research Associate
- Research Technician
What goes into a good BSc physics resume/CV?

- Writing a skill-based resume for most job applications.

- Focus on skills and practical experiences you have and required for the job! Avoid using the same resume – tailor it to the specific job!

- Translate transferable skill sets for the nontechnical reader

- Write a summary of technical qualifications
  - Lab equipment (mention expertise level)
  - Microsoft Office, Access
  - MatLab, LabView, or similar analytical/instrument control software
  - Programming languages (C++, SQL), technologies, and tools

- Only highlight coursework to demonstrate knowledge of a topic

- Include GPA, overall or major
How to get practical experience

• **Option 1:** Focus on Summer Opportunities (no interference with course work)

• **Option 2:** Do extracurricular activities / or experiential courses

• **Option 3:** Do research during the year
Summer: Where to find internships & jobs

• Go to Concordia → Physics → Summer Jobs and Opportunities

A few examples:
• NSERC USRA (at any Canadian University) - full time students
• Concordia USRA (any Department at Concordia) - full time
• Volunteer or Paid positions in our Department (research, TA)
• Career-Edge (C-Edge) – full or part time status (1 Co-op internship)
• DAAD-RISE, Germany (German Academic Exchange Service)
• Many more! (see website and ask Profs & Students)

• Use Google and other sites to find a Summer job:
Search by job titles, key words, and industries, not just “physics”.
National Research Council of Canada
Indeed
LinkedIn
District3: Center for Innovation and Enterpreneurship
How to find a MSc topic / school?

- Read research webpages / relevant publications
- Talk to faculty and graduate students! (TAs)
- Attend the weekly Colloquia to see what happens elsewhere
- Get to know research in our Department and University
- Attend Undergraduate Conferences
- Apply to Several Schools/programs! Have a plan B and C.
Department of Physics → Research

Research areas & research groups

Medical Physics Imaging
- Dr. Claudine Gauthier | Gauthier Research Group (experimental, cerebral, vascular)
- Dr. Christophe Grova | Grova Research Group (experimental, brain imaging)
- Dr. Brandon Helfield | Helfield Research Group (experimental, biomedical ultrasound)

Biophysics
- Dr. Laszlo Kalman | L. Kalman Research Group (experimental, photosynthetic processes)
- Dr. Laurent Potvin-Trottier | Potvin Lab (synthetic gene circuits)
- Dr. Valter Zazubovits | Zazubovits Research Group (experimental, biophysics photonics)

Computational Physics/Chemistry and Molecular Modeling
- Dr. Gilles Peslherbe | Peslherbe Research Group (material science, photochemistry)
- Dr. Rachael Mansbach | Mansbach Research Group (molecular dynamics, deep learning, protein folding)

Condensed Matter Physics/Nanomaterial Physics
- Dr. Pablo Bianucci | Bianucci Research Group (experimental, photonics, materials)
- Dr. Alexandre Champagne | Champagne Research Group (experimental, 2D materials)
- Dr. Saurabh Maiti | Maiti Research Group (theoretical, 2D materials, collective phenomena and quantum phases)
- Dr. Sushil K. Misra | Misra Research Group (experimental, EPR spectroscopy)
- Dr. Ingo Salzmann | Salzmann Research Group (experimental, organic semiconductors)
- Dr. P. Vasilopoulos | Vasilopoulos Research Group (theoretical, low dimensional systems)
- Dr. Truong Vo-Van | Vo-Van Research Group (experimental, nanotechnology)

Physics Education
- Dr. Calvin S. Kalman | Calvin S. Kalman Research Group

Particle Physics
- Dr. Mariana Frank | Mariana Frank Research Group (theoretical)
Summer / Grad School: When and how to apply?

- Start Early! Do your search during the early Fall
- Consult with Faculty mentors (and secure letters of reference)
- Understand the deadlines and what you need (good CV, letters of reference, cover letter, transcripts)
- Most deadlines are in Dec – Jan - Feb
- Learn how to write a good CV and Cover letter
  - Career and Planning Services (Concordia)
  - FutureReady (Concordia)
  - Careers Toolbox
Extracurricular activities

**Student associations**

**Undergraduate**
- CUBCAPS - Concordia Undergraduate Biochemistry Chemistry & Physics Society
- Concordia Student union (CSU)
- Arts and Science Federation of Associations (ASFA)

**Student Clubs**
- Space Concordia
- Artificial Intelligence Concordia
- Data Intelligence Society of Concordia
- Katalís

**Concordia Platforms**
- District 3
- PERFORM Centre
- Technology Sandbox (Library)

**Annual Events**
- Conferences for Undergraduate Women in Physics (CCUWiP) **January**
- Canadian Undergraduate Physics Conference (CUPC) **November**
- Physics Games
- CAP Congress
Networking:
Nurturing the Physics Identity

- Physics students need confidence in their career path, and career development opportunities. **Peer-to-peer interactions matter!**
- Get involved: CUBCAPS, CAP Seminar, **Colloquia**, Social events.
- **Attend Tutorials.**
- Space Concordia & AI Concordia are Physics and Engineering Clubs, which regularly attend international science competitions. (more clubs exist)
- District 3 is the Concordia entrepreneurship and start-up incubator, and offers BSc summer innovation jobs and workshops.
Resources for Career Development

- Society of Physics Students
- American Physical Society
- OUR Departmental webpage
  (Summer and Extra-Curricular, Career Development)
- Physics Faculty and Graduate Students (Talk to Us!)
- Other Students (The most surprising resource!)

Have a great Fall term!
Virtual Colloquium Series - Fall 2020

Please join us on **Wednesday, September 9th** for the opening of the Physics Colloquium Series and to meet our newest faculty member:

**Dr. Rachael Mansbach**

Zoom link: [https://concordia-ca.zoom.us/j/91469927042](https://concordia-ca.zoom.us/j/91469927042)
Password: Fall2020
The room will be open from 2h30 to 4h30 PM

---

**Learning From Life: Understanding and Design of Complex Biophysical Systems through Physical Modeling and Machine Learning**

**Dr. Rachael Mansbach**
Assistant Prof., Department of Physics, Concordia University
Department of Physics Orientation
For returning students

Part One: Student Advising (Mr. Matthew Storms)
Break: Group Discussion on Career Development
Part Two: Developing Your Career (Dr. Laszlo Kalman)
Part Three: CUBCAPS Presentation (Arielle Dascal, Christian Palmer)
Afterwards: Colloquium and Department Get-Together
CUBCAPS
WHO ARE WE?

WE ARE AN UNDERGRADUATE STUDENT RUN ORGANIZATION WHICH CREATES AND RUNS ACADEMIC AND SOCIAL EVENTS THROUGHOUT THE ACADEMIC SCHOOL YEAR.

VP Internal Physics and VP Academic Physics
AKA You’re Representatives in CUBCAPS!
WHAT EVENTS TO WE RUN?

ASFA has made an oath that since the school semester will be taking place online, all events under the ASFA umbrella must be online as well, so we’ve had to adapt as an MA.
SAMPLE LIST OF EVENTS FOR FALL 2020

Our first major event we are hosting this term is:

**CUBCAPSATHON**
September 18-20

OTHER EVENTS THIS TERM INCLUDE:

~ PERSONAL FINANCE WORKSHOP WITH DESJARDINS

~ TRIVIA NIGHTS

~ HALLOWEEN COSTUME CONTEST
PHYSICS DEPARTMENT MENTORSHIP PROGRAM

MENTE
~ IN YOUR FIRST YEAR OF THE PHYSICS PROGRAM (U0 OR U1)
~ ARE INTERESTED IN HAVING SOMEONE HELP YOU THROUGH THE YEAR
~ WANT HELP MAKING CONNECTIONS WITH PEOPLE IN THE DEPARTMENT

MENTOR
~ IN YOUR FINAL YEARS OF THE PHYSICS PROGRAM (U3 AND ABOVE)
~ ARE INTERESTED IN SHARING THE KNOWLEDGE YOU’VE GAINED THROUGHOUT THE PAST FEW YEARS
HOW TO STAY UP TO DATE WITH CUBCAPS

CUBCAPS FACEBOOK PAGE: https://www.facebook.com/cubcaps

CUBCAPS INSTAGRAM PAGE: https://www.instagram.com/cubcaps/

EVEN IF YOU DON'T CARE ABOUT CUBCAPS, WE HIGHLY RECOMMEND YOU JOIN THE CONCORDIA PHYSICS UNDERGRAD FACEBOOK PAGE, IT WILL BE AN EXCELLENT RESOURCE THROUGHOUT YOUR TIME IN THE PROGRAM

CONCORDIA PHYSICS UNDERGRADS FACEBOOK GROUP: https://www.facebook.com/groups/484038771756605