

# Formation of Planetary Systems

(Astronomy 9613b / Planetary Science 9607b)  
0.5 credits; Winter 2015

- Lectures:** Wednesdays and Fridays, 10:00 am – 11:20 am, PAB 49.  
*These meeting times will be adjusted, if necessary, at the first lecture.*  
**First lecture: Friday, January 9, 2015.**
- Instructor:** Stanimir Metchev, Associate Professor  
office: PAB 201  
email: [smetchev@uwo.ca](mailto:smetchev@uwo.ca)  
telephone: 519-661-2111, ext. 88438
- Description:** This course will introduce graduate students to the formation, evolution, and diversity of planetary systems. Topics include: properties of planetary systems, formation and dissipation of primordial circumstellar disks, growth of dust to planetesimals, formation of terrestrial and giant planets, evolution of second-generation dusty debris disks, and dynamics of planets and small bodies in mature planetary systems.
- Prerequisites:** Astronomy 9610, or permission from instructor; undergraduate-level knowledge of classical mechanics and statistical mechanics/thermodynamics.
- Textbooks:** **I.** *Astrophysics of Planet Formation*, Philip J. Armitage, 2013, Cambridge University Press. Note that Armitage's lecture notes are also **freely available online** at <http://arxiv.org/pdf/astro-ph/0701485v4.pdf>  
**II.** *The Exoplanet Handbook*, Michael Perryman, 2014, Cambridge University Press (recommended).
- Evaluation:** 60% homework assignments  
30% review paper, due April 15, 2015  
10% referee reports on peers' review papers, due April 24, 2015
- Assignments:** There will be **between six and eight homework assignments** during the semester. The homework assignments will include both numerical and analytical problems. Some of the homework assignments may include computer exercises, with programming in the student's language of choice. Students will be encouraged to work and solve problems in groups. However, every student will be responsible for his or her own submitted work. Plagiarism will be punishable by a 50% grade reduction on the relevant part of the assignment, and will be referable to the Physics and Astronomy Department Chair. Any computer code written as part of the homework should be submitted along with the assignment. Assignments up to one week late will be accepted with a 25% penalty. More than one week overdue assignments will not be accepted.
- Review Paper:** An 8–10-page review paper (single-spaced, 12 pt font, 2.5 cm margins, no figures) on a topical development in planet formation research. Up to 5 additional pages

for figures are allowed and strongly encouraged. There is no limit on the number of pages for references. The marking of the final papers will be a weighted combination of the instructor's mark (70%), and the peers' referee reports (30%).

**Referee Reports:** Each student will be assigned three of his/her peers' review papers to referee. The student will submit a 1–2-page referee report and a mark (out of 100) for each of the three papers. The marking of the referee reports will be proportional to their correlation with the instructor's marks of the same review papers.

<b>Course Schedule:</b>	weeks 1–2	detection and properties of planetary systems
(approximate)	weeks 3–4	protoplanetary disks
	weeks 5–6	growth from dust to planetesimals
	weeks 7–8	formation of terrestrial and giant planets
	weeks 9–10	evolution of planetary systems
	weeks 11–13	dynamics of mature planetary systems
	April 15, 2015	review paper due at 17:00
	April 24, 2015	referee reports due at 17:00

## University Policies

Several of the links to material and documents specified in the information below can be found at Western's Student Services web site located at <https://studentservices.uwo.ca/secure/index.cfm>.

### Accessibility

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x82147 for any specific question regarding an accommodation.

### Religious holidays

A student who, due to unavoidable conflicts with religious holidays which (a) require an absence from the University or (b) prohibit or require certain activities (i.e., activities that would make it impossible for the student to satisfy the academic requirements scheduled on the day(s) involved), is unable to write examinations and term tests on a Sabbath or Holy Day in a particular term shall give notice of this fact in writing to his or her Dean as early as possible but not later than November 15th for mid-year examinations and March 1st for final examinations, i.e., approximately two weeks after the posting of the mid-year and final examination schedule respectively. In the case of mid-term tests, such notification is to be given in writing to the instructor within 48 hours of the announcement of the date of the mid-term test. The instructor(s) in the case of mid-term tests and the Dean in the case of mid-year and spring final examinations will arrange for special examination(s) to be written at another time. In the case of mid-year and spring final examinations, the accommodation must occur no later than one month after the end of the examination period involved. It is mandatory that students seeking accommodations under this policy give notification before the deadlines, and that the Faculty accommodate these requests. The list of approved dates is updated annually and is available at Departmental, Dean and Faculty advising offices.

### Medical accommodation

- If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_medical.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf)
- A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf)

### Academic misconduct

- **Cheating:** University policy states that cheating is a scholastic offence that can result in an academic penalty (which may include expulsion from the program). If you are caught cheating, there will be no second warning. Complete information on the University policies on academic offenses can be found at [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)
- **Plagiarism:** Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing (such as footnotes or citations). Plagiarism is a major academic offence.
- Plagiarism or cheating will not be tolerated. Penalties will vary depending on the seriousness of the offence. They can range from a grade of zero on an assignment or essay, to failure of a course, to expulsion from the University.
- If you have any questions at all on this issue please consult with your instructor.

### Health and Wellness

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. for example, please check out the Faculty of Music web page <http://www.music.uwo.ca/>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca/>. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at [http://www.health.uwo.ca/mental\\_health/resources.html](http://www.health.uwo.ca/mental_health/resources.html).

To help you learn more about mental health, Western has developed an interactive mental health learning module, found at [http://www.health.uwo.ca/mental\\_health/module.html](http://www.health.uwo.ca/mental_health/module.html). This module is 30 minutes in length and provides participants with a basic understanding of mental health issues and of available campus and community resources. Topics include stress, anxiety, depression, suicide and eating disorders. After successful completion of the module, participants receive a certificate confirming their participation.