**Cells of the Innate Immune System** (1 credit) [Mon / Wed / Fri 10:30-11:30 am]

**Dr. Mark Wallet - course coordinator**

**University of Florida, College of Medicine**

**I. Course Information for Year 2018** Number: **GMS 6143**

Semester: Fall

**II. General Information**

Course director: Dr. Mark A. Wallet, PhD

Classroom location: CG56

Office location & office hours: BMS J583, 9 AM – 10 AM Tuesday

Office phone number: 352-273-8164 E-mail: mawallet@pathology.ufl.edu

Teaching Assistant: None

**III. Course Description**

* *Course goals/ Educational goals of the course*: Gain an understanding of the major cell types that make up the innate immune system. Become familiar with the concepts of innate immune cells in recognition of pathogens as well as tolerance of commensal organisms and self-tissues. Appreciate the interrelatedness of innate immune cells and the coordinated mechanisms required to thwart pathogenic microorganisms. Learn how genetic defects lead to alterations in innate immunity which cause human disease.

*Course objectives*: This course will utilize 1/3 didactic lectures, 1/3 review of historical/current literature to bridge basic concepts of innate immune cells with seminal findings in the field, and 1/3 case studies to understand how defects in innate immunity lead to clinical diseases. Literature review and case studies will be driven by student participation.

**IV. Rationale and place in the curriculum**

The current IDP graduate immunology program does not offer any similar courses. This course is designed to focus special attention on innate immune cells and their role in protective/tolerogenic immunity. While some existing courses are synergistic and address the overall immune processes that include innate and adaptive immune cells, no course provides in depth study of specific innate immune cells including macrophages, dendritic cells, neutrophils, and natural killer cells. This course will fill a major void in the curriculum by providing advanced understanding of these essential components of the human immune system so that students will have a solid foundation upon which to understand complicated immune processes.

Departmental Contact: Mark A. Wallet

Division Contact: Laurence Morel

**V. Course Materials**

Reading material will be provided to the class in PDF format via eLearning / Canvas. Case Studies in Immunology, 7th Edition (Garland Science, ISBN 978-0-8153-4512-1). Janeway’s Immunobiology 7th-9th edition may be helpful for additional reading. Students will be expected to read assigned reading and be prepared to discuss papers or case studies for each session. In general, Mondays will be dedicated to didactic lecture by the instructor, Wednesdays will include literature discussion and Fridays will focus on case studies.

Course schedule (5 weeks, 15 sessions of 1 hour):

*Please note that the class must begin promptly at 10:30am each day because there is a lot of material to cover. Any students presenting slides for a given session should arrive sufficiently early to load slides on the computer. The instructor will be present at least 10 minutes before each session to accommodate this process.*

**Week 1 (overview / innate sensing mechanism):**

* Session 1 – Wed 8/22/2018 (Wallet lecture)
	+ Innate immunology overview
	+ Innate sensing via pattern recognition receptors
* Session 2 – Fri 8/24/2018 (Literature discussion – student led)
	+ Rock, et al. A family of human receptors structurally related to Drosophila Toll [PMID 9435236] (Independent reading)
	+ Medzhitov, et al. A human homologue of the Drosophila Toll protein signals activation of adaptive immunity [PMID 9237759] (Student led)
	+ Poltorak, et al. Defective LPS signaling in C3H/HeJ and C57BL/10ScCr mice: mutations in Tlr4 gene [PMID 9851930] (Student led)
* Session 3 – Mon 8/27/2018 (Case studies – student led)
	+ Case 28 – Recurrent Herpes Simplex Encephalitis (Student led)
	+ Case 29 – Interleukin 1 Receptor-Associated Kinase 4 deficiency (Student led)

**Week 2 (neutrophils): NOTE holiday affects schedule**

* Session 4 – Wed 8/29/2018 (Wallet lecture)
	+ Neutrophils
* Session 5 – Fri 8/31/2018 (Literature discussion – student led)
	+ Page and Good. A clinical and experimental study of the function of neutrophils in the inflammatory response [PMID 13559398] (Independent reading)
	+ Babior, et al. Biological defense mechanisms. The production by leukocytes of superoxide, a potential bactericidal agent [PMID 4346473] (Student led)
	+ Reeves, et al. Killing activity of neutrophils is mediated through activation of proteases by K+ flux [PMID 11907569] (Student led)
* Session 6 – Mon 9/3/2018 – no class (Case studies review – all independent reading due to holiday)
	+ Case 25 – Severe Congenital Neutropenia (Independent reading)
	+ Case 26 – Chronic Granulomatous Disease (Independent reading)
	+ Case 27 – Leukocyte Adhesion Deficiency (Independent reading)

**Week 3 (macrophages):**

* Session 7 – Wed 9/5/2018 (Wallet lecture)
	+ Macrophages
* Session 8 – Fri 9/7/2018 – no class (Literature discussion – student led)
	+ Nakahara W. The function of macrophages in local resistance to bacterial infections [PMID 19869046]
	+ Cohn ZA. The fate of bacteria within phagocytic cells I. The degradation of isotopically labeled bacteria by polymorphonuclear leucocytes and macrophages [PMID 14022146]
	+ Nogueira N, et al. *Trypanosoma Cruzi*: Modification of macrophage function during infection [PMID 327012]
* Session 9 - Mon 9/10/20118 (Case studies – student led)
	+ Case 23 – X-Linked Hypohidrotic Ectodermal Dysplasia and Immunodeficiency (Student led)
	+ Case 24 – Interferon-γ Receptor Deficiency (Student led)

**Week 4 (dendritic cells):**

* Session 10 – Wed 9/12/2018 (Wallet lecture)
	+ Dendritic cells
* Session 11 – Fri 9/14/2018 (Literature discussion – student led)
	+ Steinman and Cohn. Identification of a novel cell type in peripheral lymphoid organs of mice. I. Morphology, quantitation, tissue distribution [PMID 4573839] (Independent reading)
	+ Steinman and Cohn. Identification of a novel cell type in peripheral lymphoid organs of mice. II. Functional properties *in vitro* [PMID 4589990] (Student led)
	+ Steinman and Cohn. Identification of a novel cell type in peripheral lymphoid organs of mice. III. Functional properties *in vivo* [PMID 4598015] (Student led)
* Session 12 – Mon 9/17/2018 (Review Paper / Case Study – student led)
	+ Collin M, et. al. Human dendritic cell deficiency: the missing ID? [PMID 21852794] (Student led)
	+ Case 49 – Contact Sensitivity to Poison Ivy (Student led)

**Week 5 (natural killer cells):**

* Session 13 – Wed 9/19/2018 (Wallet lecture)
	+ NK Cells
* Session 14 – Fri 9/21/2018 (Literature discussion – student led)
	+ Perussia et al. Murine natural killer cells express functional Fc gamma receptor II encoded by the Fc gamma R alpha gene [PMID 2526196]. (Independent reading)
	+ Liao NS, et al. MHC class I deficiency: susceptibility to natural killer (NK) cells and impaired NK activity [PMID 1853205] (Student led)
	+ Karlhofer et al. MHC class I alloantigen specificity of Ly-49+ IL-2-activated natural killer cells [PMID 1614533]. (Student led)
* Session 15 – Mon 9/24/2018 (Case studies – student led)
	+ Case 13 – X-linked Lymphoproliferative Syndrome (Student led)
	+ Case 14 – Hemophagocytic Lymphohistiocytosis (Student led)

**VI. Evaluation/ Grading/ Testing:** Grades will be based on participation and presentations. Students will present selected articles from the scientific literature or case studies of immune defects (chosen by instructor). For the Performance and Knowledge of Subject Area criterion, each paper assignment will include a list of 5-10 key concepts that must be covered in the presentation. The student’s ability to present these concepts and answer questions from the group will be assessed by the instructor.

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| **90%** | **Performance & Knowledge of Subject Area** |
| **10%** | **Participation and attendance** |
| **A**  | **94 - 100**  |
| **A­** | **93.9 - 90**  |
| **B+**  | **89.9 - 87**  |
| **B**  | **86.9 - 83**  |
| **B­** | **82.9 - 80**  |
| **C+**  | **79.9 - 77**  |
| **C**  | **76.9 - 73**  |
| **C­** | **72.9 - 70**  |
| **D+**  | **69.9 - 67**  |
| **D**  | **66.9 - 63**  |
| **D­** | **62.9 - 60**  |
| **E**  | **59.9 - 0**  |

**For more information on grades and grading policies, please visit:**

https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

**Attendance Policy**

Class attendance is mandatory. Excused absences follow the criteria of the UF Graduate Catalog (e.g., illness, serious family emergency, military obligations, religious holidays), and should be communicated to the instructor prior to the missed class day when possible. The UF Graduate Catalog is available at <http://gradcatalog.ufl.edu/>.

Students must still inform the instructor of unexcused absences. A single unexcused absence will have no effect on the course grade, but the student will be expected to read and understand course material for the missed session. A second unexcused absence will result in a letter grade reduction (e.g. A becomes B). Each subsequent undexcused absence results in another letter grade reduction. Regardless of attendance, students are responsible for all material presented in class and meeting the scheduled due dates for class assignments.  Personal issues with respect to class attendance or fulfillment of course requirements will be handled on an individual basis.

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Writing assignments will require independent thought and proper citation of sources. This is a link to a video on citing sources and avoiding plagiarism (Dr. Martin Simpson, UF)

http://mediasite.video.ufl.edu/mediasite/Viewer/?peid=adaa44500eaf460a84f238e6b9a558f91d This is a link to a website on avoiding plagiarism http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html This is a link to APA formatting http://owl.english.purdue.edu/owl/resource/560/01/

**Online course evaluations**

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evalautions.ufl.edu>.

**UF Counseling Services**

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include: UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services. Career Resource Center, Reitz Union, 392-1601, career and job search services.

Many students experience test anxiety and other stress related problems. “A Self Help Guide for Students” is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: http://www.counsel.ufl.edu/

**Honesty Policy**

All students registered at the University of Florida have agreed to comply with the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.” In addition, on all work submitted for credit the following pledge is either required or implied: “On my honor I have neither given nor received unauthorized aid in doing this assignment.” If you witness any instances of academic dishonesty in this class, please notify the instructor or contact the Student Honor Court (392-1631) or Cheating Hotline (392-6999). For additional information on Academic Honesty, please refer to the University of Florida Academic Honesty Guidelines at: http://www.dso.ufl.edu/sccr/honorcodes/conductcode.php

**Accommodation for Students with Disabilities**

Students who will require a classroom accommodation for a disability must contact the Dean of Students Office of Disability Resources, in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at: http://www.dso.ufl.edu/drc/. It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

If comfortable, please also contact the instructor directly after registering for this course so we can ensure accommodations are met in a timely manner.

**Software Use**

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

**Class demeanor**

This is an advanced course and the environment will be one of open communication and scholarly discussion. It is expected that participants exercise professionalism and judgment when using electronic devices. Participants should arrive on time and be prepared to begin at the scheduled hour. Tardiness will be reflected in the attendance category of grading. Every effort should be made to notify the instructor of planned absences, tardiness or early exit from course meetings.