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**Frontiers in Stem Cells and Regeneration  
Advanced Training Course  
October 4 - October 11, 2020  
MBL • Woods Hole, MA**

**Course Directors:**

Ina Dobrinski, DVM, MVSc, PhD (Univ. of Calgary)

Jennifer Morgan, PhD (MBL)

**Organizing Committee:** Diane Carlisle, PhD; Gloria Perez, DVM, PhD; Dorianne Mebane MBA

*All lectures are in Loeb G70, unless otherwise specified. Lab exercises are held in Loeb 306.  
Meals are in the Swope dining room, 2<sup>nd</sup> floor. Breakfast: 7-8:30 AM; Lunch: 11:30 AM-1 PM;  
Dinner: 5-7 PM.  
Coffee breaks will be served in the Loeb basement corridor adjacent to the lecture hall.*

**Sunday, October 4**

- 3:00 PM            **Optional Workshop: Basics of Cell Culturing**  
Gloria Perez, Michigan State University  
Meet in Loeb 306
  
- 5:00 PM            Dinner, Café Swope (first floor)
  
- 7:00 PM            **EEO Information and Logistics (Loeb 374):**  
Biosafety, Regulatory Restrictions, MOUs, and Team Assignments  
Diane Carlisle, U. Pittsburgh
  
- 7:15 PM            **Brief Overview of Stem Cells, Directed Differentiation and iPSCs**  
Diane Carlisle and Chas Easley
  
- 8:00 PM            **Lab 1:** *Instructor: Diane Carlisle. TA: Tanisha Singh (U. Pittsburgh).* Students differentiate hESC into their cell lineage of choice using an embryoid body-based method. On Day 1, trainees will make embryoid bodies to work with during the rest of the week.  
  
This 1-hour lab session will be conducted in groups. While one group is in the lab, the other students and faculty may join us in the break room for an informal party.

**Monday, October 5**

The 10<sup>th</sup> Aquatic Models of Human Diseases (AQMHD) conference will be held at the MBL Oct. 2-6, 2020. To provide you with an opportunity to engage with the broader scientific community, we are joining forces in the Stem Cells and Regeneration sessions as well as the evening activities.

8:30 AM	<b>Stem Cells (Joint with AQMHD: Lillie auditorium)</b> <b>Mansi Srivistava (Harvard)</b> – Regeneration in acoel worms <b>Sven Reischauer (MPI)</b> – Cardiac regeneration in zebrafish
10:00 AM	Coffee Break
10:30 AM	<b>Regeneration (Joint with AQMHD: Lillie auditorium)</b> <b>Jen Morgan (MBL)</b> - Spinal Cord Regeneration in a Non-Mammalian Vertebrate <b>Igor Schneider (Univ. of Iowa)</b> – Regeneration of Fins and Limbs
Noon	Lunch
1:00 PM	<b>Lab 1:</b> <i>Instructor: Chas Easley. TA: Katherine Watkins (UGA).</i> In this lab, students will learn procedures for deriving and culturing human induced pluripotent stem cells. Additionally students will learn how to use CRISPR/Cas9 genome editing tools to edit a house keeping gene in human pluripotent stem cells. Students will also learn to validate CRISPR-mediated gene editing using prepared DNA samples.  <b>Lab 2:</b> <i>Instructor: Cal Simerly. TA: Gloria Perez (Columbia).</i> Mouse embryonic stem cell (mESC) derivation: Students will do immunosurgery technique on mouse expanded blastocysts to isolate the ICM in order to derive mESCs.
6:00 PM	Dinner
7:00 PM	<b>Lecture:</b> Organ Regeneration in Zebrafish (with AQMHD; Location: Lillie Auditorium) Ken Poss, Duke University
8:30 PM	<b>Lightning Talks and Poster Session</b> (with AQMHD; Meigs Room in Swope)

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**Tuesday, October 6**

8:30 AM	<b>MBL Welcome</b> MBL Orientation, MBL Staff
9:30 AM	<b>Lecture: Introduction to Regeneration / Skin Regeneration</b> Jeff Biernaskie, University of Calgary
10:15 AM	<b>Coffee Break</b>
10:30 AM	<b>Lecture: Regeneration in the Salamander</b> Randal Voss, Univ. of KY
11:15 AM	<b>Lecture: Regeneration and Stem Cells in Planarian Flatworms</b> David Forsthoeftel, Oklahoma Medical Research Foundation

- 12:00 PM           **Special Topics Lunch with Vendors (Swope Private Dining Room)**  
ThermoFisher: Daria Taiakina [daria.taiakina@thermofisher.com](mailto:daria.taiakina@thermofisher.com) Cutting edge FACS technology
- 1:15 PM           **Lab 1:** *Instructors: James Monaghan and Kate McCusker; TA: Warren Vieira (U. Mass, Boston);* Regeneration in Salamanders: limb regeneration
- Lab 2:** *Instructor: David Forsthoefel; TA: Priscilla Avalos (OMRF).* Regeneration in planarians: blastema formation, proliferation, and organogenesis. Students will observe regeneration in living planarians, conduct colorimetric development of antibody-labeled samples to visualize localized proliferation, and study stages of organogenesis. They will then design and conduct their own experiment to test planarians' regenerative capacity.
- 6:00 PM           Dinner
- 7:00 PM           Ravi's Talk
- 7:45 PM           **Course Participant Introductions (Trainees and TAs)**

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**Wednesday, October 7**

- 9:00 AM           **Lecture: Picking Your Favorite - Cell Identification and Selection Strategies in Human Neural Stem Cell Biology**  
Jan Pruszek, Paracelsus Medical University (PMU), Austria.
- 9:45 AM           **Lecture: Investigating Mitochondrial Mechanisms of Sporadic ALS using Patient-Specific Motor Neurons**  
Diane Carlisle, UPitt
- 10:30 AM           Coffee Break
- 10:45 AM           **Lecture: Neuroprotective and Regenerative Stem Cell Therapy in a Pig Stroke Model**  
Franklin West, U. Georgia
- 11:30 AM           **Break**
- Noon               **Lunch**
- 1:00 PM           **Lab 1:** *Instructor: Jan Pruszek (Paracelsus Medical College); TA TBD.* "Isolating and Characterizing Neural stem cells using FACS strategy." In this laboratory, trainees will learn the techniques for isolating specific PSC-derived subsets of therapeutic and scientific relevance using flow cytometry.

**Lab 2:** *Instructors: Ava Udvardia (UWM); Sumona Dhara, TA (UWM). “Nerve regeneration in Animal Models.”* Students will learn to perform experiments on optic nerve regeneration in zebrafish.

- 6:00 PM Dinner
- 7:00 PM **Lecture: TBD**  
Goro Toshizaki, Tokyo University of Marine Science and Technology
- 8:00 PM **CAREER MENTORING DISCUSSION** (Q&A panel facilitated by Jennifer Morgan and other course faculty)

### Thursday, October 8

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- 9:00 AM **Lecture: Large Animal Models for Germ Cell Research**  
Ina Dobrinski, University of Calgary
- 9:45 AM Coffee Break
- 10:00 AM **Lecture: Translating Spermatogonial Stem Cell Transplantation to the Clinic**  
Kyle Orwig, U. Pittsburgh
- 10:45 AM **Lecture: Derivation of Functional Spermatids from Pluripotent Stem Cells**  
Chas Easley, U. Georgia
- 11:30 AM Break
- Noon Lunch
- 1:00 PM **Lab 1:** *Instructor: Diane Carlisle. TA: Tanisha Singh (U. Pittsburgh), Zach McEachin (Emory).*  
We will check the pluripotency of hESC using a live cell stain and also determine the quality of our week-long directed differentiation using PCR arrays.
- Lab 2:** *Instructor: Kyle Orwig. TAs: Meena Sukhwani (U. Pittsburgh), Chatchanan Doungkamchan (U. Pittsburgh).* We will perform hands on SSC transplantation and colony counting in mouse-to-mouse SSC transplants.
- 6:00 PM Dinner
- 7:00 PM **Regenerative Rehabilitation: TBD**  
Carmen Terzic, Mayo Clinic

8:00 PM                    **T-Shirt Night Celebration**

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**Friday, October 9**

9:00 AM                    **Lecture: Bioengineering Human CNS Morphogenesis in 2/3D**  
Randolph Ashton, U. Wisc. Madison

9:45 AM                    **Lecture: Open Slot**

10:30 AM                    **Coffee Break**

10:45 AM                    **Founder's Lecture:**  
Jerry Schatten, U. Pitt

11:30 AM                    Course Photo (Wear your T-shirts!)

Noon                        Lunch

1:00 PM                    TBD Short Lab Demos (Cephalopod arm regeneration) or Free Time

3:00 PM                    Optional: Tour of Marine Resources Center 3-4PM

6:00 PM                    Dinner

7:00 PM                    **Bioethics Lecture: Ethical and Social Aspects of Regenerative Medicine**  
Vardit Ravitsky, U. Montreal

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**Saturday, October 10**

9:00 AM                    **SCARE ALUMNI MINISYMPOSIUM**  
**Introduction:** Jen Morgan, MBL  
**Lecture: TBD**  
Larisa Condurat, Harvard (SCARE 2016)

9:30 AM                    **Lecture:**  
Janna Nawroth, Univ. of Southern California (SCARE 2017)

10:00 AM                    **Lecture: TBD**  
Mimi Sammarco, Tulane (SCARE 2017)

10:30 AM                    **Coffee Break**

10:45 AM                    **KEYNOTE ALUMNUS LECTURE: Bottom Up Islet Engineering**  
Quinn Peterson, Mayo Clinic (SCARE 2011)

11:45 AM Break  
Noon Lunch

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1:15 PM *Finish all ongoing experiments*  
**Lab 1:** *Instructors: Cal Simerly:* Check on mESC derivation.  
**Lab 2:** *Instructors: David Forsthoefel, Vasileios Morkotinis:* Evaluate blastema formation and intestinal remodeling

2:00 PM **Lab 3:** *Instructors: James Monaghan, Kate McCusker, Warren Vieira:* Image blastemas.  
**Lab 4:** *Instructor: Chas Easley. TA: Katherine Watkins:* Analysis of iPSCs using microscopy.

3:00 PM Free Time

5:00 PM **PIONEER LECTURE: Stem Cells title TBD**  
Shoukhrat Mitalipov (Oregon Health and Science University)

6:15 PM Break

6:30 PM **Course Banquet:** Café Swope

8:00 PM Presentation of Student Certificates  
Ina Dobrinski, Jennifer Morgan

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## Sunday, October 11

Check out of rooms before 10:00 AM

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Thank you to the following course sponsors who have contributed to the course by loaning equipment and/or donating reagents and supplies:

First	Last	Company	Email
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