MGY 350 Syllabus – Winter 2020
Monday and Wednesday at 3 - 4:30PM (MSB 2173)

Date	Topics	Lec #	Readings	Prof
Jan 6	**C. elegans biology and genetics** a. Developmental apoptosis, core pathway. b. Role of apoptosis in cancer	1	www.wormbase.org	BD
Jan 8	**Paper discussions:** Apoptosis pathways	2	**(1)** *Caenorhabditis elegans* gene *ced-9* protects cells from programmed cell death. Hengartner *et al*. (1992) **Nature**, 356: 494-499 **(2)** Induction of apoptosis by Drosophila reaper, hid and grim through inhibition of IAP function. Goyal *et al*. (1990) **EMBO Journal**, 19: 589-597	BD
Jan 13	**p53 and the DNA damage checkpoint**	3		BD
Jan 15	**Paper discussions:** Non-autonomous mechanisms of apoptosis	4	**(1)** A conserved CCM complex promotes apoptosis non-autonomously by regulating zinc homeostasis. Chapman *et al.* (2019) **Nature Communications**, 10(1):1791. **(2)** Modulation of ionizing radiation-induced apoptosis by bantam microRNA in *Drosophila*. Jaklevic *et al*. (2008) **Developmental Biology**, 320: 122-130	BD

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Jan 20	**Cerebral cavernous malformations**	5		BD
Jan 22	**Discussion group:** Mouse models of CCM	6	**(1)** Endothelial TLR4 and the microbiome drive cerebral cavernous malformations. Tang *et al*. **Nature**, 545(7654): 305. **(2)** Distinct cellular roles for PDCD10 define a gut-brain axis in cerebral cavernous malformation. Tang *et al*. **Science Translational Medicine,** 11(520). pii: eaaw3521.	BD
Jan 27	**Receptor tyrosine kinase signaling** a. Insulin/Dauer pathway in *C. elegans* b. Molecular control of lifespan	7	http://www.wormbook.org/chapters/www_RTKRasMAPKsignaling/RTKRasMAPKsignaling.html	BD
Jan 29	Review for mid-term exam	8		BD
Feb 3	**Modeling disease: mice, fish and iPS cells** a. Genetic models b. What models can be used for	9	Reviews on model organism genetics and organoids: **(1)** Lancaster, M. and Knoblich, J.A. (2014) **Science**. 345 (6194), 1247125. PMID 25035496 **(2)** Housden, B.E., et al (2017) **Nature Reviews Genetics**. 18 (1), 24-40. PMID 27795562	IS
Feb 5	**Discussion group:** examples of disease modeling	10	Papers for discussion: **(1)** Grimes, D.T., et al (2016) **Science**. June 10: 352 (6291):1341-4. PMID: 27284198 **(2)** Wimmer, R., et al (2019) **Nature**. 565 (7740), 505-10. PMID: 30651639	IS

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Feb 10	**Regeneration and imaging development**	11	Review on cardiac regeneration: Tzahor, E. and Poss, K.D. (2017) **Science**. 356 (6342), 1035-39. PMID: 28596337	IS
Feb 12	**Discussion group:** live imaging of development, regeneration	12	Papers for discussion: **(1)** Sako, K., et al (2016) **Cell Reports**. 16: 866-77. PMID: 27396324 **(2)** Monroe, T., et al (2019) **Developmental Cell**. 48: 1-15. PMID 30773489	IS
Feb 17	**Reading Week**		No classes	
Feb 24	**Mid-term exam**	13		BD/IS
Feb 26	**Cell lineage and genomics – new advances**	14	Review on lineage tracing: Woodworth, M.B. (2017) Nature Reviews **Genetics.** 18 (4), 230-44. PMID: 28111472	IS
Mar 2	**Discussion group:** reconstructing development using genomics and lineage tracing	15	Papers for discussion: **(1)** Gupta, V. and Poss, K.D. (2012) **Nature**. 484 (7395), 479-84. PMID: 22538609 **(2)** Dick, S., et al (2019) **Nature Immunology**. 20 (1), 39-29. PMID 30538339	IS
Mar 4	**Material review, discussion of final exam**	16		IS
Mar 9	**Introduction to model systems and cancer biology.** a. Genetic networks in yeast and human cells. b. Hallmarks of cancer.	17	Papers for discussion: **(1)** Zender, L. et al (2006) **Cell**. June 30:125(7):1253-1267. PMID:16814713Zender, **(2)** L. et al (2008) **Cell**. Nov 28:135(5):852-864. PMID:19012953	JM
Mar 11	**Cancer functional genomics** a. Tumor models, cancer genomics and genetic screens with RNA interference. b. Journal club.	18		JM

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Mar 16	**Cancer metabolism, epigenetics, immune evasion and next generation genetic screens with CRISPR.** a. Cancer metabolism, epigenetics, and immune evasion. b. CRISPR review and genetic screens with CRISPR.	19		JM
Mar 18	**Cancer immunotherapy target discovery** a. Applications for CRISPR technology in disease modelling. b. Journal club.	20	Paper for discussion: Platt, R. et al (2014) **Cell**. Oct 9: 159(2):440-455. PMID:25263330	JM
Mar 23	**Cancer immunotherapy models and essential genes.** a. Cancer immunotherapy models. b. Discovery of essential genes in human cell lines.	21		JM
Mar 25	**Going from genetic screens to development of novel biologics.** a. Biologics and modeling drug efficacy in disease models. b. Journal club.	22	Paper for discussion: Steinhart, Z. et al (2017) **Nat Med**. Jan;23(1):60-68. PMID:27869803	JM
Mar 30	**Tumor heterogeneity and cancer stem cells.** a. Surveying tumor heterogeneity. b. Cancer stem cells and models.	23		JM
Apr 1	**Review for final exam**	24		JM

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Mid-term exam (Feb. 24, 2020):	25%
Journal club attendance and participation:	25%
Final exam (April, 2020):	50%
Total	100%