

MSFP: Checklist of topics and resources (by C. Jeffery)

The following outline includes topics covered in Orientations and Workshops along with some tips on activities to include in the workshops. References to some resources and publications about some of the topics are included. Additional information about some topics was through personal communications or was found online in unpublished sources.

Introduction to Macromolecular Structure and Function

This included a review of amino acids, protein primary, secondary, tertiary, and quaternary structure, hydrogen bonds and other interactions, domains and motifs, binding, enzyme catalysis, inhibition, and regulation, transmembrane protein structure and function, the fluid mosaic model of membrane structure, and hydrophathy plots
Lehninger's Principles of Biochemistry chapters on:

- Amino acids, peptides, and proteins
- The three-dimensional structure of proteins
- Protein function
- Enzymes
- Nucleotides and nucleic acids
- Biological membranes and transport

The Structures of Life (2007) NIH Publication No. 07-2778. U.S. Department of Health and Human Services. National Institute of General Medical Sciences.

Some faculty mentors gave oral presentations about their research with an introduction to the methods used (for example, molecular dynamics).

Databases, Servers

See example worksheet in Supplementary Materials - Part 5

UniProt - The UniProt Consortium (2017) UniProt: the universal protein knowledgebase. *Nucleic Acids Res.*, 45, D158-D169.

BLAST - McGinnis, S. and Madden, T.L. (2004) BLAST: at the core of a powerful and diverse set of sequence analysis tools. *Nucleic Acids Res.*, 32, W20-5.

TMHMM - Krogh, B. Larsson, G., Heijne, G. and Sonnhammer, E.L.L. (2001) Predicting transmembrane protein topology with a hidden Markov model: Application to complete genomes. *Journal of Molecular Biology*, 305, 567-580.

MoonProt - Chen, C., *et al.* (2021) MoonProt 3.0: an update of the moonlighting proteins database. *Nucleic Acids Res.*, 49, D368-D372.

Determining macromolecular structure

X-ray Crystallography

The Structures of Life (2007) NIH Publication No. 07-2778. U.S. Department of Health and Human Services. National Institute of General Medical Sciences.

Intro to research and tips for a successful research experience

Falcinelli, S. (2015) 11 Tips for your first undergraduate research experience. *ASBMB Today*, May 2015, 36-36.

Tips on how to keep a lab notebook – See Supplementary Materials – Part 4

Sample lab notebook page

How to read a journal article

Finding journal articles with Pubmed

Purugganan,M., Hewitt,J. How to Read a Scientific Article. Cain Project in Engineering and Professional Communication.

Presentation about Gap year

With tips on how to find a gap year research opportunity, how to contact faculty members

Presentation by a graduate student who had worked as a technician during a gap year

Writing a scientific paper

Provide students with an example of a scientific manuscript

How to Write Your First Paper (2019) Biophysical Society Newsletter, June 2019, 10-11.

Jenkins,S. (1995) How to write a paper for a scientific journal. Australian Journal of Physiotherapy, 41, 285 - 289

Writing an abstract

McKee,K. (2018) How to write a scientific abstract (online, no publication information)

Workshop on writing and giving a seminar

Tips for Great Oral Presentations. Biophysical Society Newsletter, November 2019, Page 8. (and references therein)

Westberg,J., Jason,H. (1991) Making Presentations. Boulder, CO: Centre Communications.

Ethics

Code of Ethics for Undergraduate Research, Copyright © 2017 The Council on Undergraduate Research.

Carpi,A., Egger,A.E. (2009) Scientific Ethics, Visionlearning Vol. POS-2.

Graduate school

Panel discussion with current graduate students

What do students do in graduate school

How to apply to graduate school

How to pay for graduate school

Diversity

Kinds of diversity, benefits to science, discrimination, dealing with discrimination, building a network, allyship

Making and Presenting Posters

Provided an example of a poster

Vega,Q. (2015) 10 reasons your poster will impress and amaze at the annual meeting.

Quinn Vega, ASBMB Today, March.

Presentation on making elevator pitches

For examples, see online videos of 2012 ASCB elevator pitch contest winners – Kiani Gardner, Michael McGuire,

Creating an IDP

Clifford, P.S., Fuhrmann, C.N., Lindstaedt, B., Hobin, J.A. (2013) An individual development plan will help you get where you want to go. *Physiologist*, 56, 43-4.

Web site for American Chemical Society IDP:

<https://chemidp.acs.org/assess-yourself>

Mentor and Student Participant Orientation topics

Dates of program activities, program goals, contact information, mentor roles, evaluations, restrictions,

Suggestions for Fostering a Productive Faculty-Student Relationship

Checklist for Students to Ensure Productivity – See Supplementary Materials – Part 4

Potential discussion topics for mentors and mentees (for example, topics in effective use of time, graduate school, professional responsibility, professional development, balancing professional and personal life)

Student assignments (weekly meetings, workshops, creating poster, abstract, presentation)

Student Participant Assignments

Pre-survey

Photo for abstract book

Elevator pitch (presented during one of the workshops or group meetings)

3 Evaluations

Final abstract for Abstract book

Research Paper

Poster

Powerpoint file of oral research presentation

Give oral presentation at Research Symposium