Supplemental Materials

for

Developing a Backup Plan: Implementing a Career-Planning Course for Undergraduate Biology Majors

Julianne M. Winters¹, Haizhi Wang², Laura E. Duwel³, Elizabeth A. Spudich⁴, and Jennifer S. Stanford⁵*
¹Department of Integrative Biology, University of California, Berkeley, Berkeley, CA 94720-3140; ²Brown University, Butler Hospital, Providence, RI 02906; ³Department of Biology, Drexel University, Philadelphia, PA 19104; ⁴Department of Pathology, Anatomy and Cell Biology, Thomas Jefferson University, Philadelphia, PA 19107; ⁵Department of Biology, CASTLE, Drexel University, Philadelphia, PA 19104

Table of Contents
(Total pages 15)
Appendix 1: Biology career planning course – example syllabus
Appendix 2: Planning for your future career worksheet
Appendix 3: Reflection on the viability of your future career plans
Appendix 4: Plan of study assignment
Appendix 5: Personal branding assignment
Appendix 6: Personal statement assignment
Appendix 7: Final plan and alternate plan for your future career
Appendix 8: Additional suggestions for implementation

*Corresponding author. Mailing address: Department of Biology, CASTLE, Drexel University, 3245 Chestnut Street, Philadelphia, PA 19104. Phone: 215-895-6180. E-mail: jss75@drexel.edu.
Received: 11 August 2017, Accepted: 15 July 2018, Published: 31 October 2018.

©2018 Author(s). Published by the American Society for Microbiology. This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial-NoDerivatives 4.0 International license (https://creativecommons.org/licenses/by-nc-nd/4.0/ and https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode), which grants the public the nonexclusive right to copy, distribute, or display the published work.
Appendix 1: Biology Career Planning Course – Example Syllabus

Required Text: There is no required textbook for this course. However, various readings and support materials may be posted on Bb Vista.

Course Description:
Biology Career Planning is a course that is intended to aid you in your professional development as a Biology major. In this course, you will be given instruction on planning and preparing for a future career that fits with your goals, abilities, and interests, as well as opportunities to develop materials to help you in your search for and/or pursuit of a future career.

Course Purpose within the Program of Study:
This is a required course that is meant to aid you in your professional development. At this point in your training, we want you to begin thinking realistically about your future career goals and how you can attain them. This course is intended to aid you in developing primary and back-up plans for your future career to help you to consider what courses, activities and events will be most productive in helping you to achieve your goals in the remainder of your training as a Biology major.

Statement of Expected Learning:
As a result of this course, students will:
1. Explore career options available to them as Biology majors, and identify their strengths and weaknesses relevant to these possible options.
2. Develop a primary and alternate plan for their future careers.
3. Learn how to brand themselves effectively in job and professional school applications.
4. Create a cover letter and resume for a specific job, and receive feedback on these submitted materials.
5. Develop strategies to best utilize the resources available during their remaining time in their undergraduate careers at Drexel to allow them to best prepare themselves for their intended careers.

Assessment:
You will be assessed in a variety of ways in this course, and ultimately, the grade you earn in the class will be dependent on your performance on the combination of assignments listed below. Information about what you will need to do to complete each assignment will be posted on the course website.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Focus Assessment</td>
<td>5%</td>
</tr>
<tr>
<td>Planning for your future career worksheet</td>
<td>10%</td>
</tr>
<tr>
<td>Reflection on the viability of your future career plans</td>
<td>10%</td>
</tr>
<tr>
<td>Plan of study assignment</td>
<td>15%</td>
</tr>
<tr>
<td>Personal branding assignment</td>
<td>10%</td>
</tr>
<tr>
<td>Personal statement assignment</td>
<td>10%</td>
</tr>
<tr>
<td>Final plan and alternate plan for your future career</td>
<td>10%</td>
</tr>
<tr>
<td>Attendance and participation</td>
<td>30%</td>
</tr>
<tr>
<td>Week</td>
<td>Class Session</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 1    | • Introduction to the course  
      • Discuss expectations and goals for the term | • No assignments are due at this session                                                   |
| 2    | • Career profiling  
      • Visit from Career Counselor | • Complete Type Focus Assessment and submit your letter code to your instructor            |
| 3    | • Careers in biology  
      • Discussion about being realistic about your goals | • Planning for your future career worksheet due                                             |
| 4    | • Applying to graduate or clinical programs | • Review posted materials                                                               |
| 5    | • Visit from the Biology Department Undergraduate Advisor  
      • Discussion about plan of study development | • Reflection on the viability of your career plans due                                     |
| 6    | • Discussion about professional networking | • Plan of study due                                                                       |
| 7    | • Personal branding  
      • Cover letters, resumes and CVs | • Review posted materials                                                               |
| 8    | • Personal statements | • Personal branding assignment due                                                      |
| 9    | • Peer review | • Personal statement assignment due                                                    |
| 10   | • Wrap-Up | • Final plan and alternate plan for your future career due                             |
Appendix 2: Planning for Your Future Career Worksheet

1. Please indicate your primary career goal. If you are not sure yet what you would like to do, indicate the career goal that, at this moment, you believe you will most likely pursue. Please answer this question in five words or less, and with one answer only.

2. In one sentence, please describe what is most attractive about this career for you:

3. Briefly outline the educational path and timeline needed for you to get to the point where you have a real job in your field of interest, from the time of graduation to the time you expect to be in a job in that field. For example, if you wanted to have a career as a faculty member in Biology: Ph.D. program (~5 years), post-doctoral fellowship (~4 years), apply for faculty positions.

4. What is your current GPA:

5. What concentration are you planning on pursuing, and, in brief, how do you think that concentration will help you with your career goals?

6. Please list the extracurricular activities that you have already engaged in, or are currently engaging in, that you believe are relevant to achieving your primary career goal. Extracurricular activities could include: work, internship experiences, volunteering, shadowing someone in the profession, research, clubs, honor societies, etc. Basically, you should include anything you do outside of the classroom that you think is helping you to achieve your career goal. Next to each activity you list, if this is a current activity, indicate how many hours per week you spend participating in this activity; if this is an activity that you are no longer engaging in, estimate how many total hours you spent participating in this activity. Here is an example:
   
   Volunteer at X hospital (20 hours total)
   Independent research in Dr. Y’s lab (5 hrs per week)

7. List the individuals from whom you would feel comfortable asking for a recommendation letter, and their relationship to you (i.e. internship advisor, instructor, research advisor, etc.). If the individual is an instructor, indicate how many courses you have taken with this instructor. Please list no more than four individuals.

8. If you are planning to pursue additional schooling to achieve your career goal, please indicate what exam you need to take to gain entrance into this program, and when you plan to take this exam (i.e. MCAT, spring term of my junior year; or GRE, summer after my junior year).

9. What courses do you plan to take in future terms that you think will be directly helpful in preparing for your future career:

10. How likely do you think it is that you will be able to achieve your primary career goal? Please circle one of the following choices:

   Very Likely       Likely       Possible       Unlikely       Very Unlikely
11. It is prudent for everyone to avoid putting all of their eggs into one basket, and as a result, we are asking each of you to consider an alternate to your primary career goal. Even if you feel very confident that you can achieve your primary career goal, we still would like you to consider an alternative. Sometimes unexpected issues arise, and we want you to be prepared with a plan for an alternative career. As a result, please indicate your alternate career goal. Of note, your alternate career goal needs to be completely distinct from your primary career goal. If you indicated that your primary career goal was to become a cardiologist, you cannot write an alternative medical specialty here as your alternate career. Your alternate career needs to be a separate path from your primary career goal. As an example, if your primary career goal is to become a doctor (of whatever specialty), your alternate career goal could be to become a physician assistant, or a dental hygienist, or a research scientist, etc. If you are not sure, please indicate the most likely career option you would pursue if your primary career goal did not work out for you. Please answer this question in five words or less, and with one answer only.

12. In one sentence, please describe what is most attractive about this alternate career option for you:

13. Briefly outline the educational path and timeline needed for you to get to the point where you have a real job in this alternate field of interest, from the time of graduation to the time you expect to be in a job in that field. For example, if you wanted to have a career as a faculty member in Biology: Ph.D. program (~5 years), post-doctoral fellowship (~4 years), apply for faculty positions.

14. How do you think the concentration you are planning on pursuing will help you with your alternate career goal? Please answer this question using the space provided.

15. Please list the extracurricular activities that you have already engaged in, or are currently engaging in, that you believe are relevant to achieving your alternate career goal. Just as above, next to each activity you list, if this is a current activity, indicate how many hours per week you spend participating in this activity; if this is an activity that you are no longer engaging in, estimate how many total hours you spent participating in this activity. If you need more space, use the back of the page.

16. If you would need to pursue additional schooling to achieve your alternate career goal, please indicate what exam you need to take to gain entrance into this program, and whether you currently plan to take this exam (i.e. GRE, not currently planning to take this exam; DAT, currently planning to take this exam)

17. What courses do you currently plan to take in future terms that you think will be directly helpful in preparing for this alternate career:

18. How likely do you think it is that you will be able to achieve your alternate career goal? Please circle one of the following choices:

   Very Likely    Likely    Possible    Unlikely    Very Unlikely
Appendix 3: Reflection on the viability of your future career plans

Write a one-page, single-spaced, discussion of the viability of your future career plans at this stage in your undergraduate career.

You should include:

- A discussion of your primary career goal. Based on your GPA, current extracurricular activities, plans for future courses and extracurricular activities, how likely is it that you will be able to achieve this goal?
- A discussion of your alternate career goal. How likely is it that you will pursue this goal based on the status of your primary career goal? Based on your current preparation and plans for continued preparation, how likely is it that you will be able to achieve this goal?
- A discussion of the most important next steps that you think you need to take to prepare yourself, realistically, for a future career.
Appendix 4: Plan of Study Assignment

You will be required to schedule an appointment with the Biology Department Undergraduate Advisor and to complete a plan of study as part of the class this term. At this appointment, you will discuss your plan of study for your remaining terms. This is intended to help with your planning so that you can achieve the goals you have set for yourself in terms of: the classes you plan to take, the intended timing of your graduation, achieving a minor, and/or planning other activities that might affect the timing of your classes such as Co-op or study abroad. To complete these assignments, please do the following:

- Contact your advisor to set up an appointment to discuss your plan of study. You must submit a copy of the email that you sent to your advisor to make this appointment. If you do not set an appointment for this meeting you will not receive credit for this assignment, however, you will still be required to schedule an appointment and meet with your advisor.

- Complete a plan of study. Go to the course website and download the Plan of Study PDF file. Fill out the courses that you’ve already completed in your freshman year, and then complete your remaining terms based on the courses you need for the concentration you intend to choose.

- Meet with your advisor to discuss your plan of study. **You must bring your completed plan of study to this appointment.** The advisor will let your instructor know when you have completed this assignment. If you do not meet with your advisor by Week 6 with your completed plan of study, you will not receive credit for this assignment, however, you will still be required to complete the assignment to complete the course.
Appendix 5: Personal Branding Assignment

1. We would like you to go through the process of preparing elements of a job application. This may be something you are already planning to do at the end of your training, or it may be something you will need to do if you need to take a gap year before you start a professional school program. In either case, we would like you to be prepared to apply for jobs.

2. Find a job posting of interest to you that requires some skill sets you feel you have now or will have by the time you graduate. Please include the advertisement for the job that you selected to apply to with your submitted assignment.

3. Construct a resume tailored to the advertised position.

4. Construct a cover letter tailored to the advertised position.

5. Submit the resume, cover letter and job advertisement.
Appendix 6: Personal Statement Assignment

We would like you to gain experience with writing a personal statement. We want to give you some training in this area, and to provide some feedback on your initial draft of this document. Even if you are not currently planning to attend future schooling, we would like you to be prepared to apply if this becomes of interest to you at any point. As well, many of the elements of writing a strong personal statement are related and applicable to writing a strong cover letter. As a result, this will provide you with extra practice with these skills.

For this assignment, you will need to write a 1-2 page (single spaced, Times New Roman, 12 point font) draft of a personal statement that could ultimately be used in future applications for further schooling. As discussed in class, you should describe why you want to achieve that degree/attend that school program, and the qualifications you have that make you a good candidate for a program of that type. It should be clear from your personal statement what type of program you plan to apply to (i.e. medical school, Ph.D. programs in neuroscience, MS program in forensics, veterinary school, PA school, post-bac program, etc.). If you do not currently plan to apply to additional school programs, choose a program that is currently the most relevant to your future career goal as the focus of this personal statement. For example, if you plan to get a job in the pharmaceutical industry after graduation, you could plan to write a personal statement for a MS program in Biology (or a specific subfield).
Appendix 7: Final Plan and Alternate Plan for Your Future Career

1. Please indicate your current primary career goal. Please answer this question in five words or less, and with one answer only.

2. Please list the extracurricular activities that you plan to do in the future (i.e. in addition to what you’ve already done), which are relevant to achieving your primary career goal. Again, this can include: work, internship experiences, volunteering, shadowing someone in the profession, research, clubs, honor societies, etc.

3. Please indicate your current alternative career goal. Again, this needs to be a distinct career path from your primary career goal. Please answer this question in five words or less, and with one answer only.

4. Please list the extracurricular activities that you plan to do in the future (i.e. in addition to what you’ve already done), which are relevant to achieving your alternate career goal. Again, this can include: work, internship experiences, volunteering, shadowing someone in the profession, research, clubs, honor societies, etc.

5. If you already have three people that you believe could write you strong recommendation letters to support you in your pursuit of your primary career goal, please list them here, along with their relationship to you (i.e. internship advisor, instructor, research advisor, etc.), and how long they have known you (or if an instructor – how many courses have you taken with this instructor). If you do not have three people that you believe would write you strong recommendation letters, please indicate what you plan to do to develop stronger professional relationships that will help you in your pursuit of a career.

6. Would you ask the same individuals to write you recommendation letters to support your pursuit of an alternative career goal? If not, please indicate what you plan to do to develop professional relationships that will help you in the case that you need to pursue your alternate option.

7. If you need to pursue additional schooling to achieve your primary and/or alternate career goal, please indicate what exam(s) you need to take to gain entrance, and whether you currently plan to take this/these exam(s) (i.e. for the primary goal, I need to take MCATs, and for my alternate goal, I need to take the GREs, and I am planning to take both).

8. How likely do you think it is that you will be able to achieve your primary career goal? Please circle one of the following choices:

   - Very Likely
   - Likely
   - Possible
   - Unlikely
   - Very Unlikely

9. How likely do you think it is that you will be able to achieve your alternate career goal? Please circle one of the following choices:

   - Very Likely
   - Likely
   - Possible
   - Unlikely
   - Very Unlikely
10. Considering everything you have learned about yourself in this course, please reflect on your current plans for preparing for your future career. Which career option do you think is most feasible? Do you think your current plans for the rest of your time as an undergraduate will be sufficient to support your pursuit of that career option?
Appendix 8: Additional Suggestions for Implementation

To help with implementation at other institutions, here is some additional information:

- Information provided to students about the stages of career planning (career exploration, gaining experience, developing career management skills, and implementing career goals)
  - Career exploration
    - Here we tell students to identify goals for their careers. We have them use their outcomes from the TypeFocus™ assessment to identify their personality type, stated interests and values, and use the information from the assessment to identify careers that might be relevant to these aspects. We discuss different aspects of a career that might be relevant to personal happiness or individual needs (i.e. financial, status, amount of control over their day-to-day work, what day-to-day work entails, flexibility in scheduling).
    - We also encourage them to explore options for careers with their degree. Some of these resources include: career counseling center on campus or any career resources on campus (i.e. library), career exploration guides online, career exploration books, professional associations. If you do not have a career counseling center or career counselor on campus, often librarians can be a good resource for supporting students in searching for career information.
    - We discuss careers in biology specifically: health professions, allied health and health-related (MD, dentist, dental assistant, hygienist, nurse, PT, PA, optometry, podiatry, etc.), research (industry, academia, clinical, biotech, pharmaceutical), environmental management and conservation (green jobs), education (colleges and universities, K-12 schools, science museums, zoos, aquariums, parks and nature centers), biotechnology (enhancing products, tools and technological advances in fields like agricultural food science and medicine), forensic science, politics/policy, business and industry (sales, marketing, public relations), economics (economic impacts of biological issues), science writing and communication, art (illustrations for textbook companies).
  - Gaining experience
    - Here we tell students to learn more about careers of interest to them. What careers are out there? What is required to successfully land a career in that area? We tell them about the need to be realistic about their ability to achieve that career goal. For example – is their GPA relevant to the next stage of that career? If so, how realistic is it that someone with a particular type of GPA will make it to that next stage? How realistic is it to improve your GPA and how much?
  - Developing career management skills
    - We talk about the importance of planning for multiple career paths, especially why it is important to develop an alternate goal. One of the main issues discussed here is to ensure that the alternate goal is something that the student is excited about and has the skills to be successful at moving to the next stage of that career. We emphasize the need to choose multiple paths that fit with their overall goals for a career, and the need to plan to achieve these goals.

- [https://www.aibs.org/careers/](https://www.aibs.org/careers/)
We discuss what students need to do to forge particular career paths. This includes: what they need to do to be prepared for the next stage, what programs/jobs they may be applying for are looking for in candidates, and what skills they need. We emphasize exploration of topics such as: need for volunteer hours, GPA requirements, entrance exams and related scores, other activities/skills, and experience level needed.

We discuss professional networking. We emphasize the idea that anyone can be a possible professional contact and that they should use these contacts to learn about relevant career paths. We also discuss the importance of acknowledging the help they receive and describe how to expand their professional network.

- Implementing career goals
  - We have sessions focused on personal branding to allow students to market themselves to potential employers/school programs. This includes development of resumes, cover letters, and personal statements.

To advise students in how to develop a plan of study for clinical or graduate programs, we discuss:

- Why individuals might choose to go to graduate or medical school
- Types of programs (MD, DO, MD/PhD, PhD, MS, etc.)
- How to choose a program. This discussion usually includes topics such as: being realistic about the programs that you can get into, thinking about the location of the programs, thinking about the types of research they might want to do (if a graduate program), considering the way that the program is administered/taught
- Getting accepted to a program. This discussion usually includes topics such as what types of areas are considered in an application/interview process, and what should you do to prepare for your application/interview process
- Specifically for clinical careers, we discuss the following:
  - What type of program(s) are interesting (MD, DO, DDS, DMD, PA, PT, NP, etc.)
  - Are there location preferences (city, country, specific location within the US, etc.)
  - Being realistic about GPA and entrance exam scores
  - What entrance exams they have to take (we typically have them look this up on their own).
  - What are the GPA ranges that are relevant for getting into their programs of interest
  - To apply they will need a personal statement, letters of recommendation, activities (shadowing, volunteering), an application
  - Critical for entering most clinical programs is shadowing and volunteer experiences.
  - Letters of recommendation – we discuss the need for them to make meaningful choices about who they select for this (professors, job/internship supervisor, person they shadowed, volunteer supervisor) and to make good connections with people they think they may want to ask for recommendations so that these individuals can write meaningful letters.
  - Application – we discuss the idea that the evaluators are often looking to see whether the applicant can handle the material that they will be learning and whether they will be on par with their cohort. We also discuss that it is critical for the applicant to demonstrate that they really understand the program they are applying for and why they are interested in that program.
Specifically for graduate school programs, we discuss the following:

- What type of program(s) are interesting (MS non-thesis, MS with thesis, Ph.D.)
- Choosing a program should focus on the content/focus of the programs of interest (i.e. a broad umbrella program versus a more focused topical program), faculty and faculty research interests, location, funding opportunities, and other opportunities relating to your interests (i.e. the opportunity to take business courses or courses about pedagogy)
- Be realistic about GPA and entrance exam scores
- What entrance exams they have to take (GREs – general/subject tests)
- What are the GPA ranges that are relevant for getting into their programs of interest
- To apply they will need a personal statement, letters of recommendation, activities (research), an application
- Critical for entering most graduate programs, especially MS with thesis and PhD programs, is significant research experience
- Letters of recommendation – we discuss the need for them to make meaningful choices about who they select for this (professors, job/internship supervisor, research mentor) and to make good connections with them so that these individuals can write meaningful letters.
- Application – we discuss the idea that the evaluators are often looking to see whether the applicant can handle the material that they will be learning and whether they will be on par with their cohort. We also discuss that it is critical for the applicant to demonstrate that they really understand the program they are applying for and why they are interested in that program. Critical to graduate school applications is often a demonstrated understanding of and interest in conducting research

Information provided about personal statements:

- Start by generating an outline of what you want to say in your statement
- Explain clearly why you want to do whatever you are applying for.
- Convince the reader that you are interested in a job/school program for the right reasons.
- What skills do you have that make you a good candidate? Be specific about the places or experiences that allowed you to gain these skills. Talk about your volunteering, shadowing, research, and/or jobs – whatever is relevant to the program you are applying for. Expand on things in your resume – how are they relevant/transferrable? It could be relevant to talk about a job that is not clinically related or research related in nature if you can demonstrate that you learned skills or ideas that are important for your future work. For example, you may have learned how to interact better with people as a waiter/waitress; or you may have learned how to work as part of a team in your internship experience.
- Provide information about what you have done without bragging or judging yourself and your contributions. Be factual.
- Explain who you’ve worked with/for. You never know when someone reading your application may know someone who you have worked with/for, which may help with your application.
- Provide details about your experience. Share information that cannot be gleaned from a resume, including relevant experiences that address the skill sets of interest to the program. Details are helpful to allow the reviewers to have a clear understanding of what you have done that is relevant.
o Explain special issues that are not revealed elsewhere in your application. This might include topics such as that you: had a significant workload outside of school (40 hr a week job), were the primary caregiver for a family member, had inconsistencies in your academic record.
o Don’t include references to experiences/accomplishments from prior to college or references to controversial subjects

o Give yourself time to develop the personal statement and get feedback from others on the ideas and writing. Edit the statement for clarity. Ensure that you do not have types/misspellings/grammatical errors. Flowery writing that “feels” symbolic is not good if the reader cannot understand what you are saying – this is where feedback can help.
o Common pitfalls:
  ▪ Demonstrates little or no understanding of the program/school being applied for. The reviewers want to know that the person knows what they are getting into and will be likely to retain to graduation. As part of this, try to tailor your personal letter to the position or school if you have the opportunity to do that (i.e. not a common application).
  ▪ Provides little or no specifics. You need to justify the skills that you say you have. Where did you gain them? Do you have experiences that demonstrate the skill? Be specific. Make sure the skills you mention are tailored to what you are applying for.
  ▪ Emphasizes negativity. Don’t blame your failures on others. If you have a flaw in your application, explain it as needed. Try to address it in a positive way.
  ▪ Not including the information that was asked for in the application.
  ▪ Being overly egotistic – “I know I’m the best candidate.” This type of approach can be a turnoff for many reviewers.
o Here are some additional resources:
  ▪ https://career.berkeley.edu/grad/gradstatement.stm
  ▪ http://owl.english.purdue.edu/owl/resource/642/01/
  ▪ http://www.usnews.com/education/blogs/medical-school-admissions-doctor/2011/05/30/6-personal-statement-dos-and-donts