GETTING A TENURE-TRACK FACULTY POSITION AT A TEACHING-CENTERED RESEARCH UNIVERSITY

Foreword to Chemical Engineering Faculty

As faculty advisors and mentors we are highly invested in the future success of our graduate students. One of the greatest challenges facing graduating Ph.D. and post-doctoral students is successfully obtaining a tenure-track position in academia, whether it be in chemical engineering or a closely related discipline. Through this article, we seek to help students overcome this barrier by explaining the faculty selection process and providing insights into what search committees are looking for in an applicant. By reflecting upon our previous experiences on faculty search committees, we hope to prepare tenure-track seeking applicants as they begin their search and help them avoid common pitfalls. While parts of this article speak to teaching-centered research schools, which equally weigh an applicant's teaching and research expertise, most of the information presented here is broadly applicable and would benefit anyone applying for tenure-track positions at any university. We hope you will use this as a resource for your senior-level Ph.D. students and post-docs interested in academia, as this article provides a look behind the scenes into the faculty selection process.

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Having been on several search committees, we have seen countless instances where strong candidates make crucial errors in their application packets that result in them being eliminated. Often, applicants put tens of hours into their applications, but not enough time where it really counts. A strong application is personalized to the job posting, meaning that a shotgun approach to applying for tenure-track faculty positions will typically prove unsuccessful. The best applicants, and the ones that really catch our attention, are those who take the time to understand the position for which they are applying. Our goal is to help tenure-track seeking applicants understand the process behind faculty

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searches, successfully develop their submission packet, and avoid common mistakes that result in great candidates being overlooked.

This article is unique in the respect that it is presented from the point of view of selection committee members and describes our perspective into the hiring process. The selection committee is comprised of multiple, diverse faculty at a university who are responsible for reviewing all the submitted applications, scoring them against the criteria stated in the job description, selecting candidates, and carrying out phone and campus interviews. In addition to this article, several blogs and online resources exist, primarily written from the perspective of an applicant or newly hired faculty members, which provide supplemental information to assist you during your search process.[1-3] The remainder of this article will focus on providing you, the applicant, information to assist you during your search for a tenure-track faculty position.

BEFORE YOU APPLY

If this is your first time looking into tenure-track positions in higher education, familiarize yourself with the basics. For starters, educate yourself with regards to the structure and hierarchy of academia. Do you know the difference between the position titles adjunct faculty, lecturer, research professor, assistant professor, associate professor, and full professor? Having an understanding of these differences will help you apply to the correct positions or classification for calls with multiple listings (*i.e.*, assistant or associate level). In addition, now is a good time to gain an understanding of what life as a tenure-track professor involves and what would be expected of you, including teaching, scholarship, mentoring, and service responsibilities.[4,5]

Also, make sure you are looking for positions that are the right fit with regards to your career goals. Now's the time to ask yourself what your dream job would look like. Do you envision yourself surrounded by graduate students in your laboratory with minimal teaching or do you prefer developing students, both graduate and undergraduate, in the classroom and through research? There is no right or wrong answer here, but try to have an honest conversation with yourself about what type of tenure-track position would suit you best and why. Next, you should search for and identify listings that are a right fit for your experience, skill set, and vision of your academic career. This step is much harder than it sounds, as educating yourself on the culture of both a department and university can take significant effort.

When you are considering a school of interest, a good first step is to make sure you identify what degrees are actually offered. Say you are applying to the Department of Chemical and NanoBioCatalysisRobotic Engineering. Do they have a Ph.D. program in chemical engineering? Do they have an undergraduate program in nanobiocatalysis-robotic engineering? Maybe they offer a graduate degree that doesn't appear in their departmental name at all. The degrees that are offered, and how many are awarded per year, will help shape your understanding of the department you are applying to and should be reflected in the content of your application packet.

As no one is an expert on every chemical engineering school, the Carnegie Classifications are an exceptional tool to help you quickly assess the culture of an institution.[6] Table 1 includes the Carnegie Classification framework and what information you can ascertain from each category. Perhaps the most pertinent for your search are the Basic, Graduate Instructional Program, and Enrollment Profile. Together, these should give you a general feel for the student population, research activity, and focus of graduate majors on campus. For example, the University of Dayton is a STEM-focused, higher research activity doctoral university with a high undergraduate population. The high undergraduate population indicates that we are a teaching-focused school. The higher research activity emphasizes that in addition to teaching, STEM-focused research is also a priority on campus.

KNOW YOUR AUDIENCE

It cannot be stated more clearly: Do your research. As evaluators, it is very easy for us to tell who put the effort into personalizing their application to match the job posting, the department, and the university. We suggest taking the time to find the necessary information to make your application stand out.

TABLE 1
Carnegie Classifications of Institutions in Higher Education

Carnegie Classification:	What it tells you:
Basic	What is the highest degree level and the intensity of research activity
Undergraduate Instructional Program	What programs are the focus of undergraduate education
Graduate Instructional Program	Classifies the nature of graduate degrees on campus
Enrollment Profile	Division of student population between undergraduate and graduate
Undergraduate Profile Classification	Provides a snapshot of the typical undergraduate student
Size & Setting Classification	Describes the size and residential character of the student population

First steps include exploring the departmental, faculty, and university websites, as well as reading current research articles from faculty of interest. If possible, learn more about the university's culture by talking with people who have connections there. Alumni groups are a great place to start. Additionally, using other resources, such as the Carnegie Classifications or the ASEE Profiles of Engineering Colleges, can help you get a general sense of the university environment.[6,7] Keep in mind that while these resources can help you gain a sense of the department and university in general, you will not be able to get a true understanding of the departmental culture without first-hand interactions and experiences.[8]

THE APPLICATION: WHAT WE WANT TO SEE

The search committee might see a hundred applicants for a single position, so take the time to polish your submission package and help us identify you as a top candidate during the screening process. Thoroughly read the job description and be sure to address all points by some means or another. Also realize that sometimes a human resources (HR) department has some ridiculous applicant software that is not very straightforward to use. For example, during a recent search we required that applicants include all their transcripts, but the HR application website only allowed one transcript file. The best applicants, but unfortunately not everyone, scanned all transcripts into one file first before submission. Do not be surprised if you run into a similar situation. If there is an item from the job description that does not appear as an option for the application software then find a way to fix it.

Be sure that you submit all required materials as stated in the advertisement. Most universities will request a specific list of documents, but on occasion the guidelines are not as clear-cut. When in doubt, the full application should contain at least the following:

- *A cover letter (on letterhead, if available).*
- *A full curriculum vitae (c.v.).*
- *A list of references (three to six).*
- *A statement of teaching interests and philosophy.*
- *A summary of research and future research interests.*
- *All academic transcripts.*

Cover Letter: In your cover letter, start by addressing the search chair or committee and state why you are writing (to apply for xxx job that was advertised in yyy). Next, realize that this is where you can tell your story and highlight how you envision yourself contributing to the department. Unlike the c.v., this is a narrative and can include things that are not readily apparent from the rest of your application packet.

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Perhaps you did a year of service, which helps explain a year of inactivity on your c.v., or you took an industrial position before deciding that academia was for you. Whatever your special situation may be, this is a good place to relay that information.

Moreover, the cover letter is the place to discuss any criteria you do not meet or to clarify any points regarding your submission. Be sure to address all the specific requirements of the job ad, including both research and teaching interests. Tell the committee why your previous research was important and the direction you plan on pursuing with your own research group. Identify any prior teaching experiences or, at a minimum, touch upon your motivation for teaching and where you feel you could contribute to the department. If the university you are applying to has a teaching emphasis, make sure you discuss both your previous experiences and interest in teaching in your cover letter. If the ad states that grant writing experience is a plus mention any grant writing efforts here, especially if you have been funded. Finish with a polite thank you and that you look forward to hearing from them soon.

The C.V.: The position for which you are applying is an academic position and the c.v. serves as a summary of your credentials. Constructing your academic c.v. takes a considerable amount of time, and we strongly recommend that you put the effort into building a strong, complete c.v. before you apply. If you have never prepared your full c.v. several guides are available to assist you.[9,10] The most important credentials for an academic position are the degrees that you have obtained. Put these first. Then list academic, post-doc, and/or research positions that you have held followed by other work (co-op,

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internships, etc.). Only include positions that are relevant to your application. If you worked as a server in a restaurant to help get through school, that shouldn't be included in your c.v.

Next is a section on grants. If you have successfully obtained funding, be sure to indicate PI or co-PI if applicable, dollar amounts, and funding sources. Don't stretch the truth, but do include relevant work. Did you apply for and receive a fellowship that funded your graduate work? If so, include that. Did you help your advisor write an NSF grant? Even if you don't have funded grants, describe any writing experiences to let the committee know that you are familiar with the grant-writing process.

Next, number and list your publications. Start with journal articles (citations and impact factors are helpful here), followed by books/chapters, and then patents. Finish with conference publications and presentations. If you have any papers that received awards, indicate this here. As a rule of thumb, you should have two or three journal articles from your graduate work. Add two more journal articles for each year of post-doc. Having post-doc experience is becoming increasingly important, especially in specialized fields such as bioengineering, materials, and energy, where additional credentials become necessary.

A section on any teaching and mentoring experience that you have had should follow. For teaching-focused institutions, in particular, excluding this section will get you eliminated from the search. We want to know that your previous experiences in teaching are just as valuable to you as your research. If you have previously taught a class, especially if you were the teacher of record, make sure that is noted. If you haven't taught before, highlight any experience you have as a teaching assistant or grader. Be sure to indicate if you have taken any teaching preparatory courses as well. This is also a good place to include your student mentoring history. Include how many undergraduate and graduate students you previously helped mentor. If you have minimal teaching experience, make sure to highlight your mentoring history, especially if you served as mentor for a diverse group of students.

Finish with a list of any awards or scholarships that you have received. Again, focus on relevance. While holding a high school swim record may be a personal point of pride, it doesn't help your application for a faculty position. At this point you should also include your professional memberships and if you serve as a reviewer for any peer-reviewed journals.

Letters of Recommendation: Be sure to include your M.S., Ph.D., and post-doc advisors; these are the most important. Add any supervisors from industry or research collaborators. Perhaps include an undergraduate faculty member if you are thin on references. If one of your key advisors is missing from the list, that will lead the search committee to speculate. Your selected references should be in a higher-level, more experienced position than the one you are applying for. We have actually had an applicant ask an undergraduate student to write and submit one of their mere three letters of recommendation. Don't do that. Additionally, make sure the people you list as references know which faculty positions you are applying for and have a copy of your current c.v.

Statement of Teaching Interests and Philosophy: For teaching-focused departments this is a crucial section and should not be rushed. Your teaching interests should include both courses that the department needs taught (consider checking their course catalog before you apply) plus one or two specialized graduate courses. Also, be specific. Saying that you would teach biomaterials could mean many things. The committee would be more impressed if you could state the specific area of biomaterials (biomimetics, implants, scaffolding, compatibilities, etc.) you want to teach, the key prerequisites, and a likely textbook. Be absolutely sure that you include courses that the school currently offers and that you have an interest in teaching.

Whether you have been the instructor of record, a substitute for a day, or even a TA, find a way to obtain and share student feedback with the committee. A letter of recommendation from your department chair or advisor is a good way to get this included. Another way to incorporate this feedback is by discussing how your previous experiences have influenced your current teaching philosophy. Presenting student feedback reinforces your commitment to teaching and demonstrates that you take student comments seriously.

Keep the statement of teaching philosophy simple and not

too radical (unless that is what you are striving to achieve). However, make sure you put serious thought into this section, especially if you are applying to a teaching-centered institution. What you are hoping to achieve in this section is to paint a picture of what your classroom will be like and your preferred teaching styles. If you have never given serious thought to establishing your own teaching approaches, or do not feel that you have adequate knowledge in this area, several resources are available to help you develop this section of your application.[11,12] For positions with an emphasis on teaching, a fantastic teaching plan can help make you a leading candidate, whereas a poorly developed one can remove you from further consideration.

Statement of Research Interest: One misconception about teaching-centered chemical engineering departments is that research isn't a major consideration. When evaluating candidates, we are looking for applications that present strong research proposals in addition to solid teaching experiences. To stand out to the selection committee your packet should reflect that dual criteria. When writing your research statement, make our work easy: we can't be experts in every research field that falls under the label of "chemical engineering." Leave us with a simple summary that we can explain to the other faculty members in a sentence or two. Having said this, don't simply give broad strokes as to your research interests. The challenge of this section is to describe your research plan, provide relevant background, and present your rationale in a concise and user-friendly manner. This will take many iterations to achieve.

Here you should summarize your active areas of research plus outline the first two or three areas you plan on pursuing as a new faculty member. These proposed research objectives should demonstrate that your research group will be in an area independent from your previous advisors. While it is not necessary to branch off into a new field altogether, make sure you follow a unique path separate from your previous research. You also need to demonstrate to the search committee that you have the credentials to perform your proposed work. This makes for a tricky balancing act of being unique from your advisor but within your field of expertise. This dilemma is one reason why good post-doc experience can strengthen an application: It provides a separate research avenue to enrich the proposed research plan.

The future research should look nearly ready to submit for a grant, but shorter. Including a list of funding agencies specific to your area shows that you are already considering proposal submissions. Simply making a list of NSF, NIH, DOE,[13-15] for example, is insufficient. Instead, list specific programs you would target, such as the Energy for Sustainability program within the CBET division of NSF. This, too, will take research.

WHAT WE REALLY WANT TO SEE (AKA, WHAT MAKES US DROOL)

A strong university pedigree can go a long way. Seeing degrees from top-tier engineering schools is certainly more impressive than one from the University of South Antarctica—Penguin Branch. This is not something that you can easily change by the time that you read this article. A good alternative is to post-doc somewhere impressive, which can help bridge the gap and assist in professional development.

From a teaching perspective, the most impressive component is having teaching experience as the instructor of record for a full course. This shows us that not only do you have the experience but you really understand what you're getting into. If you have limited teaching experience, and have time before you apply for tenure-track positions, consider contacting local colleges to see if you can teach a course as an adjunct instructor. Teaching awards can be the icing on the cake.

From a research perspective, the most impressive item to see is that you have grant funding that can travel with you to the new university. This alone can make some other concerns disappear. If you are applying for an associate-level position, in addition to a track record of grant funding, an ideal applicant is one whose c.v. is ready to submit for tenure (a complicated topic that is beyond the scope of this article).

BEFORE YOU HIT THE SUBMIT BUTTON

Proofread, proofread, and proofread. With over 100 applicants per position, don't give the search committee any reason to eliminate you. If competition is tight, poor grammar and typos can be the difference between making it to the next stage or not. Ask your advisor, peers, and friends to read through your application and provide feedback. Then read over your packet again.

If you are using a cover letter template for more than one application, double check that the one you are submitting has the correct university listed. For every search we see at least one applicant who starts with, "I would like to apply for the tenure-track position at yyy" where yyy is not the University of Dayton. We stop reading at that point.

Once you get all your documents uploaded, view your packet to make sure everything is actually there and in the correct format. If the system converts your application into a single PDF file, take the time to go through page by page and ensure nothing was eliminated. Then hit submit and let out a sigh of relief.

THE PHONE INTERVIEW

If you are lucky enough to pass the first screening, you will be one of 10-12 applicants to receive a phone interview.

You should be given some advance notice by the committee, so you will have time to prepare, to speak freely, and have your materials at hand. One of the primary goals of the phone interview is for the search committee to get an initial evaluation of your oral communication skills. It is also a test to see if you did your homework.

You now have advance notice, and the committee has some interest, so go much deeper in your research of the department. At this point you must know their courses by name (and possibly catalog number) and their key faculty members. Be ready to state which of the courses you are prepared to teach and why you are interested in those classes. For teaching-focused schools, you should be ready to describe your previous teaching experiences in detail, recap your teaching philosophy, and discuss what you feel are the best educational practices.[16] From the research perspective, be prepared to say with whom you might collaborate within the department, university, or local resources unique to that university. It is also a good idea at this point to have a budget prepared that includes costs for necessary equipment, consumables, and student support.

Be aware that anything that you say becomes fair-game, so be prepared for follow-up questions from the committee. For example, one applicant said she wanted to move to Dayton from another university to have more collaborators. However when asked with whom she'd want to collaborate, she was unable to name anyone. Remember that the search committee saw something they liked in your application, so at this point, the campus interview stage is yours to lose.

THE CAMPUS INTERVIEW

Congratulations, you did it! You are likely one of the final three candidates standing. You will be given detailed instructions regarding the itinerary for your trip to campus. During the campus interview you will spend time with the search committee, some departmental faculty, the chair, the dean, the provost, and a select group of students. You will be asked to give a presentation on your research to a diverse group of faculty. If the position involves significant teaching, you might also be asked to teach a lecture to an undergraduate class. Don't panic, you will be given advance notice about the course and content to be covered. You will likely have breakfast, lunch, and dinner with select folks of interest. They are simply evaluating your social skills, so be yourself.

The presentation is arguably the most important aspect of the on-campus interview as it is where you have the opportunity to sell yourself to a larger audience. As only a small handful of people will have seen your application, you should provide some general background information, such as where you obtained your degrees and served your post-doc. Lead into the highlights of your previous research and what the focus of your research group would be heading forward. Make sure you have clear, well-outlined projects that you would be targeting with your initial efforts. For a teaching-focused research university, don't forget to include a discussion on teaching. Remember, your efforts will be split between teaching and research and we are expecting to see development from both sides in your presentation. You should include your previous teaching experiences, what core classes would best suit your talents, and what new classes you would like to develop for the program. Again, highlight that you did your homework. Explain how your research could align with specific faculty members or local companies, use correct class numbers and names, and discuss how you would fit into the overall culture of the university. Your presentation should also demonstrate that you can speak clearly in the language in which you will be instructing. It is not a concern if it is not your native language, but make sure your communication skills are strong.

From a teaching perspective, the most impressive component is having teaching experience as the instructor of record for a full course. This shows us that not only do you have the experience but you really understand what you're getting into.

Be prepared to answer some difficult questions about yourself. Why do you want to be a professor? What makes you a strong candidate? What specific divisions and funding agencies do you plan on seeking funding from? What will be the topic of your first grant proposal? What attracted you to our university? Make sure you consider these questions along with traditional ones about your background.

Additionally, be prepared with questions of your own. It's expected that you will have relevant questions for everyone with whom you interview. If possible, these should be specific to the university. For example, what are the evaluation criteria for promotion and tenure? What is a typical start-up package size?

Can you describe the culture of the department and the university? What is a typical teaching/research/service split for a semester?

Following both phone and on-site interviews, it is recommended that you send a thank you email to key people, including the selection committee and faculty members you met with one-on-one. Progressing through a faculty search at a university is a slow process because chosen candidates must be approved at each stage by multiple levels including departmental, university, and HR. Additionally, trying to coordinate the chaotic schedules of multiple faculty members is no easy task. Therefore do not be surprised if it takes a while to hear back after interviewing. If an extended time period has passed you may send a follow-up email to the head of the selection committee, but it is recommended that you keep these inquiries to a minimum.

FINAL THOUGHTS

If you are embarking on this journey and are not quite sure where to start, we would recommend that you consider presenting a poster at AIChE's "Meet the Faculty Candidate" session. This is a tremendous opportunity for you to organize and present your data, get your name out there as someone who is searching for a tenure-track faculty position, and see what schools are actively hiring. This can also be a good time to practice your interviewing skills, as you will likely be asked questions that will arise during phone and campus interviews.

One last word of advice—take some time during your visit to get a general sense of the community and culture on campus. As we previously discussed, while online resources such as the Carnegie Classifications can provide a glimpse into a university's culture, the true environment cannot be fully appreciated or experienced until you step foot onto campus. Part of this job-seeking process is you interviewing the university to find the best fit for yourself. Things to consider include how the balance of teaching, research, and service align with your academic vision and your preference as to whether a department is characterized as more collegial or competitive.[17] If you find a department for which you are excited to work and feel at home, your chances of success will greatly increase. Best wishes on your search!

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Author Guidelines for the
LABORATORY
Feature

The laboratory experience in chemical engineering education has long been an integral part of our curricula. *CEE* encourages the submission of manuscripts describing innovations in the laboratory ranging from large-scale unit operations experiments to demonstrations appropriate for the classroom. The following guidelines are offered to assist authors in the preparation of manuscripts that are informative to our readership. These are only suggestions, based on the comments of previous reviewers; authors should use their own judgment in presenting their experiences. A set of general guidelines and advice to the author can be found at our website: <http://che.ufl.edu/~cee/>.

- Manuscripts should describe the results of original and laboratory-tested ideas. The ideas should be broadly applicable and described in sufficient detail to allow and motivate others to adapt the ideas to their own curricula. It is noted that the readership of *CEE* is largely faculty and instructors. Manuscripts must contain an abstract and often include an **Introduction, Literature Review, Laboratory Description, Data Analysis, Summary of Experiences, Assessment, Conclusions**, and **References**.
  - An **Introduction** should establish the context of the laboratory experience (*e.g.*, relation to curriculum, review of literature), state the learning objectives, and describe the rationale and approach.
  - The **Literature Review** discusses appropriate technical and pedagogical articles and books related to the experiment.
  - The **Laboratory Description** section should describe the experiment in sufficient detail to allow the reader to judge the scope of effort required to implement a similar experiment on his or her campus. Schematic diagrams or photos, cost information, and references to previous publications and Web sites, etc., are usually of benefit. Issues related to safety should be addressed as well as any special operating procedures.
  - If appropriate, a **Data Analysis** section should be included that concisely describes the method of data analysis. Recognizing that the audience is primarily faculty, the description of the underlying theory should be referenced or brief. The purpose of this section is to communicate to the reader specific student-learning opportunities (*e.g.*, treatment of reaction-rate data in a temperature range that includes two mechanisms).
  - The purpose of the **Summary of Experiences** section is to convey the results of laboratory or classroom testing. The section can enumerate, for example, best practices, pitfalls, student survey results, or anecdotal material.
  - The purpose of the **Assessment** section is to show proof that the students met the specified outcomes of the experiment.
  - A concise statement of the **Conclusions** (as opposed to a summary) of your experiences should be the last section of the paper prior to listing **References**.