

Technical Manuscript Writing for Doctoral Candidates

David J. Keffer
Department of Chemical and Biomolecular Engineering
Yonsei University
dkeffer@utk.edu

Module 1. Introduction; Selection of an Appropriate Journal

Course Objective

The purpose of this course is to develop and instill good habits and a high standard of professionalism for the generation of manuscripts with the explicit purpose of the dissemination of scientific knowledge via archival, refereed journals.

Motivation

The path toward good science encounters many obstacles. Once the selection of the area of study and the formulation of the hypothesis have been done, there are inevitably numerous challenges, detours, digressions, dead-ends and delays. Once the work is complete and the science has been done, one must disseminate the knowledge gained from the research activities. This dissemination is at least as crucial an element of science as the actual research itself. If one doesn't share the results of one's work, it will have no impact.

There are additional challenges associated with the dissemination of the knowledge through the traditional scientific channel of archival, refereed journals. There are technical challenges associated with the clear and accurate reporting of the scientific results. There are writing challenges associated with adhering to convention with regard to the content and format of the manuscript. Finally, there are often political challenges associated with navigating the peer-review process. This course attempts to educate the student with regard to the nature of these challenges and to teach them to prepare a manuscript that can successfully overcome these challenges, appear in the published literature, and contribute to the body of scientific knowledge.

Selection of the Appropriate Journal

In coming to the point in which one has performed some research worthy of publication, one has already invariably read numerous articles from archival, refereed journals. This knowledge of the published body of work was necessary in order to develop a research approach that was not simply reproducing work already done elsewhere and was informed by contemporary research. Thus, one already has some familiarity with the journals of the field.

The selection of the appropriate journal must be based on several criteria. These criteria are discussed individually below.

Criterion 1. Field of Study

There are journals for physics, chemistry, biology, chemical engineering etc. Within a given discipline, such as Chemical Engineering, there are journals targeted at experimental data, for example the *Journal of Chemical and Engineering Data*. There are journals with an industrial flavor, such as the *Industrial & Engineering Chemistry Research*. There are journals targeted at

just a narrower field within a discipline, such as the *Journal of Non-Newtonian Fluid Mechanics*. There are journals targeted at very specific techniques, such as *Molecular Simulation*. When journals become too large, they split up into separate journals. For example, the Journal of Physical Chemistry, once a single journal, is now three journals, *Journal of Physical Chemistry A*, *Journal of Physical Chemistry B*, and *Journal of Physical Chemistry C*. *Physical Review* has five journals A through E and a separate journal for letters, *Physical Review Letters*. Each journal has a specific target. Even in this interdisciplinary age, where a chemical engineer can publish in chemistry, physics, or biology journals, each journal has a specific target and readership. It is important to understand what the content and readership of a journal is.

One good rule of thumb for identifying an appropriate journal is to look at the papers that you have used as references for your own work and see where they were published. If you have several papers from *Physical Review E*, then *Physical Review E* may very well be an appropriate destination for your work.

One can also go look at the table of contents of recent issues of the journal to make sure that the work in question is appropriate for a given journal. The judgment cannot be made strictly on the basis of the title of the journal, or a single article in the journal.

If you are entering a new field and trying to publish in a journal that you have not previously published in before, there is never any harm in asking a more senior researcher, with whom you are on friendly terms, for their opinion on the appropriateness of the journal that you have selected.

It is important to note that the choice of journal will impact the manuscript. While there are obvious formatting differences between journals, there are also more subtle stylistic differences between journals. One of the key points is brevity. Some journals insist on short, concise descriptions of procedures. In some cases the typical description in some journals is insufficient to actually recreate the experiment in question. Other journals allow for a more detailed description of the experimental or computational procedure, because they are targeting a narrower readership with greater interest in details. In general, the broader the readership of a journal, the less detail will be allowed in the manuscript. Many journals make up for this by allowing a “Supporting Information” document. This document can contain all kinds of detailed information on procedures and tables of data. It is not published in the paper version of the journal but is available free of charge (usually) online. The article will note that a “Supporting Information” document is available, so that readers will be aware of its existence.

Criterion 2. Type of Article

In general there are three types of articles: letters, reviews and regular articles. A letter is a short article, for which the timeframe associated with the total publication process is generally shorter than for other types of articles. Letters are intended as a means of rapid communication of an important result. A review is a comprehensive study of the state of a field. These are longer articles, with a thorough literature review, typically invited by the editors of the journal. This course will focus on regular articles, which attempt to summarize in depth the results of a given research activity.

Some journals publish only one type of article. *Chemical Reviews*, for example, publishes review articles. A review article is tremendously useful as a starting point for the literature review of a field with which one is unfamiliar. Other journals, such as *Physical Review Letters*, publish only letters. Many journals have separate sections for letters, regular articles and reviews.

Criterion 3. Impact Factor

Each journal has an impact factor, which is updated annually. The impact factor is defined as follows. The impact factor for a given journal is the average number of citations received per paper published in that journal during the two preceding years.

http://thomsonreuters.com/products_services/science/academic/impact_factor/] For example, if a journal has an impact factor of 3 in 2008, then its papers published in 2006 and 2007 received 3 citations each on average. In Table 1, find some recent impact factors for selected journals.

journal	Impact Factor 2009	5-year average
Science	28.103	30.268
Nature	31.434	31.210
Physical Review Letters	7.180	7.134
Journal of the American Chemical Society	8.580	-
Nano Letters	10.371	12.189
Journal of Physical Chemistry B	3.471	-
Physical Review B	3.322	3.284
Chemical Reviews	35.957	-

Table 1. Examples of impact factors

Impact factors are viewed as a measure of the readership and prestige of a journal. Like anything else, impact factors can be manipulated and abused. Regardless, one's work should target a journal with the appropriate impact factor. If one has some really ground-breaking research in a field, you should target a high profile journal with a high impact factor. If one has some good quality, important research then you target a more modest journal. If one submits an article to a high profile journal, the editor may deem it to be insufficiently important and return it without external peer review. You may think that little is lost by submitting it to a higher profile journal, but one must remember that different journals have different styles. There can be considerable work involved in tailoring a manuscript for a particular journal. Specifically, it takes substantial effort to shorten a work from a regular article to a letter form. If the letter is targeted at a high profile journal and is rejected, one can still submit the longer article to another journal, but considerable time and effort has been wasted. Of course, one doesn't want to submit high quality work to a journal with a very low impact factor, as very few will find it and read it.

Criterion 4. Geographic Location

Many English-language journals are published in the United States or in Europe. Some journals have different geographical demographics in terms of their readership. One should go to several recent issues and examine where the locations of the institutions associated with the authors of the papers. You want to make sure you are publishing in a journal that will reach your peers and other intended audience.