

What is the Right Medical Informatics Training For Me? – A Case Study from Oregon Health & Science University

a report by

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An individual considering spending part or all of their working time in health and biomedical informatics may find the decision of what career path and/or educational programme to choose somewhat daunting. As the author has noted in another paper,¹ this reflects the fact that:

- informatics is still a maturing discipline;
- there is no standard curriculum, programme accreditation, or individual certification; and
- the role of information technology (IT) in health and biomedicine is still evolving.

Nonetheless, these are exciting times for the informatics field, with the growing recognition of the need for better use of IT in clinical settings as well as biomedical research.

The Practice of Informatics

There is a growing – though by no means complete – consensus on the types of jobs performed in informatics. The author's view, based on the inventory of competencies developed by Covvey et al.,² is that there are three general levels of informatics practice.

Another near-consensus observation is that the type of informatics job one performs is somewhat dependent on one's background. Those with healthcare backgrounds, particularly medicine or nursing, are likely to draw on that expertise for their informatics work in roles such as a chief medical or nursing information officer. Those who do not have healthcare backgrounds still have plenty of opportunity in the field, but are more likely to end up in the wide variety of other jobs available, everything from local project leaders to chief information officers.

Most current informatics leaders also believe there is a growing need for 'local experts' in informatics. As we know that one of the major success factors for an IT project is engagement of the user community, there will be a growing need for those who represent the 'users' in a well-informed way.

It should also be noted that the lines between these categories are fuzzy. The informatics leader at a large medical centre may well need (or desire) the breadth of training of an academic informatician. Likewise, the local expert in a community hospital or large clinical practice may also want to have additional training at or near the level of an informatics professional. The amount of expertise among the levels, especially between expert and professional, may really be more of a continuum, with the expert advancing to the professional level as his or her career develops.

With this basic overview of the field, we can now move on to the basic question of this document: what is the right informatics education for me to pursue? This discussion will emanate from the context of the educational programme developed at Oregon Health & Science University (OHSU); other programmes have some or all of the comparable levels of training.

Training to Pursue in the OHSU Context

The programmes at OHSU have been developed in a building-block fashion. That is, coursework done at the lower levels can be carried forward to the higher levels. It should be noted that all of the programmes at OHSU are currently at the graduate level, i.e. require a bachelor's degree. However, we are currently exploring undergraduate educational programmes.

OHSU's informatics programmes are available via distance learning. We have successfully offered most

1. Hersh WR, "Who are the informaticians? What we know and should know", *J Am Med Informat Assoc* (2006);13: pp. 166–170.
2. Covvey H D, Zitner D, Bernstein R, *Pointing the Way: Competencies and Curricula in Health Informatics* (2001), University of Waterloo: Waterloo, Ontario, Canada.

of our courses and programmes online for half a decade. Our programme has evolved to the point where online and on-campus offerings are considered equivalent and not distinguished on a student's transcript. Distance learning does not mean 'distant' learning. We have standardised a number of technologies that provide high-quality and interactive education. Our courses are not correspondence courses, and require a reasonable commitment of one's time for success. Almost all of the course activities are, however, asynchronous, meaning that students can access the material on their schedule as long as they keep up with the overall class.

Most of our courses, whether online or on-campus, are three-credit courses. As OHSU is on an academic quarter system, courses are 11 weeks in duration. A three-credit course typically means a commitment of 6–10 hours per week of work. Most courses have activities typical of university courses, with lectures (online classes typically use voice over slides), readings, term projects, homework, and examinations.

One pathway into the OHSU programme is the 10x10 Program. Run in partnership with the American Medical Informatics Association (AMIA), this programme aims to train individuals at the expert level. The 10x10 moniker comes from a goal to train 10,000 healthcare professionals by 2010 in basic informatics so they can be local experts representing users in their communities.

This course, which is administered by AMIA, is an adaptation of the introductory course in the OHSU curriculum, with an addition of a one to two day in-person session covering additional material in an interactive manner. As such, the 10x10 course can be used for subsequent credit in the other OHSU programmes pending successful completion of the course's final examination (which is not required in 10x10).

The remainder of the programmes are run from OHSU. The Graduate Certificate programme focuses on the core of biomedical informatics. After the introductory course, students take more advanced courses in areas such as clinical systems, information retrieval and organisational behaviour and management. They can also take additional electives as well as pursue practicum projects in their own communities. The Graduate Certificate programme requires 24 credits, or eight three-credit courses, for graduation.

OHSU offers two master's degree programmes that differ only in their culminating project. The master of science (MS) in biomedical informatics requires a master's thesis, while the master of biomedical

informatics (MBI) is a 'professional master's' and requires a less-intensive capstone project. The master's degree programmes have two 'tracks', one in medical informatics and the other in bioinformatics.

The curriculum for each of the tracks is organised into 'domains', each of which is a general curriculum area and has both required modules and choices from a list. The five domains in the medical informatics track are:

- biomedical informatics – core courses in informatics science and applications;
- organisational and management sciences – business and management issues;
- computer science – practical introduction. Concepts are more important than programming;
- health and biomedicine – for non-clinicians; and
- research methods – statistics plus quantitative and qualitative methods.

Students can enter the master's degree programmes either directly or by advancing from the 10x10 or Graduate Certificate programmes. Both programmes are available on-campus or via distance learning. Students in either programme can mix or match on-line or on-campus courses.

The PhD programme is a purely on-campus programme, although PhD students can take individual courses that are offered on-line. Consistent with the building-block approach, courses taken at lower levels of study are part of the PhD programme 'knowledge base' and can be carried forward into the programme. The PhD programme requires advanced study culminating in a dissertation consisting of independent research. All PhD students are supported with a tuition waiver, stipend and benefits from training or research grants.

Table 1 provides an overview with website addresses for the programmes described above. The 10x10 programme is administered by AMIA. The Graduate Certificate programme has rolling admissions, i.e., students are admitted any quarter to begin classes the following one. The master's and PhD programmes, however, only have admissions once a year to begin in the autumn quarter.

OHSU also offers a fellowship programme funded by training grants from the National Library of Medicine (NLM) and Veterans Administration (VA). Three types of fellowships are available from the NLM training grant:

Table 1: Overview of Oregon Health & Science University Informatics Programmes

Program Name	Web Site	Admission Requirements	Graduation Requirements
10x10	http://www.amia.org/10x10	None	Completion of coursework
Graduate Certificate in Biomedical Informatics	http://www.ohsu.edu/dmice/certificate	Bachelor's degree in any field	24 credits (generally eight three-credit courses)
Master of Biomedical Informatics	http://www.ohsu.edu/dmice/mmi	Bachelor's degree in any field plus introductory courses in computer science and anatomy & physiology	52 credits (48 hours of instruction plus four hours of capstone project)
Master of Science in Biomedical Informatics	http://www.ohsu.edu/dmice/ms	Bachelor's degree in any field plus introductory courses in computer science and anatomy & physiology	60 credits (48 hours of instruction plus 12 hours of master's thesis)
Doctor of Philosophy (PhD) in Biomedical Informatics	http://www.ohsu.edu/dmice/phd	Bachelor's degree in any field plus introductory courses in computer science and anatomy & physiology	135 credits, including dissertation

- predoctoral – stipend and tuition support for some students in the PhD programme; seeking advanced training in informatics, with the option of a degree (typically the master's degree).
- postdoctoral – for those with doctoral (e.g. MD or PhD) degrees who seek advanced training, with or without a degree (although most pursue a master's degree); The VA fellowship is for postdoctoral clinicians only and has a clinical service component. ■
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 - AMIA 10x10 Program

On-campus Programs
including Masters, Postdoctoral Fellowship, and PhD are also available.

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