Bioinformatics Education

- Methods
  - Survey of Directors of Bioinformatics Core Facilities
    - Capture perspectives from representatives of employers of professional bioinformaticians
  - Survey of Career Opportunities
    - Analysis of the ISCB - Membership Job Board postings
  - Preliminary survey of existing curricula
    - 72 awarding Bachelor of science, arts or technology
    - 38 awarding Master of science, research or biotechnology
    - 39 awarding PhD

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Table 2. Core competencies for each bioinformatics training category.

	Bioinformatics User	Bioinformatics Scientist	Bioinformatics Engineer
(a) An ability to apply knowledge of computing, biology, statistics, and mathematics appropriate to the discipline.		X	X
(b) An ability to analyze a problem and identify and define the computing requirements appropriate to its solution.		X	X
(c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs in scientific environments.			X
(d) An ability to use current techniques, skills, and tools necessary for computational biology practice.	X	X	X
(e) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.			X

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(e) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.			X
(f) An ability to apply design and development principles in the construction of software systems of varying complexity.			X
(g) An ability to function effectively on teams to accomplish a common goal.	X	X	X
(h) An understanding of professional, ethical, legal, security, and social issues and responsibilities.	X	X	X
(i) An ability to communicate effectively with a range of audiences.	X	X	X
(j) An ability to analyze the local and global impact of bioinformatics and genomics on individuals, organizations, and society.	X	X	X
(k) Recognition of the need for and an ability to engage in continuing professional development.	X	X	X
(l) Detailed understanding of the scientific discovery process and of the role of bioinformatics in it.	X	X	X
(m) An ability to apply statistical research methods in the contexts of molecular biology, genomics, medical, and population genetics research.	X	X	X
(n) Knowledge of general biology, in-depth knowledge of at least one area of biology, and understanding of biological data generation technologies.	X	X	X

Bioinformatics Education

Bioinformatics training: a review of challenges, actions and support requirements.

Schneider MV[1], Watson J, Attwood T, Rother K, Budd A, McDowall J, Via A, Fernandes P, Nyronen T, Blicher T, Jones P, Blatter MC, De Las Rivas J, Judge DP, van der Gool W, Brooksbank C.

⊕ Author information

Abstract

As bioinformatics becomes increasingly central to research in the molecular life sciences, the need to train non-bioinformaticians to make the most of bioinformatics resources is growing. Here, we review the key challenges and pitfalls to providing effective training for users of bioinformatics services, and discuss successful training strategies shared by a diverse set of bioinformatics trainers. We also identify steps that trainers in bioinformatics could take together to advance the state of the art in current training practices. The ideas presented in this article derive from the first Trainer Networking Session held under the auspices of the EU-funded SLING Integrating Activity, which took place in November 2009.

Bioinformatics Education

Bioinformatics training: selecting an appropriate learning content management system--an example from the European Bioinformatics Institute.

Wright VA[1], Vaughan BW, Laurent T, Lopez R, Brooksbank C, Schneider MV.

⊕ Author information

Abstract

Today's molecular life scientists are well educated in the emerging experimental tools of their trade, but when it comes to training on the myriad of resources and tools for dealing with biological data, a less ideal situation emerges. Often bioinformatics users receive no formal training on how to make the most of the bioinformatics resources and tools available in the public domain. The European Bioinformatics Institute, which is part of the European Molecular Biology Laboratory (EMBL-EBI), holds the world's most comprehensive collection of molecular data, and training the research community to exploit this information is embedded in the EBI's mission. We have evaluated eLearning, in parallel with face-to-face courses, as a means of training users of our data resources and tools. We anticipate that eLearning will become an increasingly important vehicle for delivering training to our growing user base, so we have undertaken an extensive review of Learning Content Management Systems (LCMSs). Here, we describe the process that we used, which considered the requirements of trainees, trainers and systems administrators, as well as taking into account our organizational values and needs. This review describes the literature survey, user discussions and scripted platform testing that we performed to narrow down our choice of platform from 36 to a single platform. We hope that it will serve as guidance for others who are seeking to incorporate eLearning into their bioinformatics training programmes.

Bioinformatics Education

Best practices in bioinformatics training for life scientists.

Via A[1], Blicher T, Bongcam-Rudloff E, Brazas MD, Brooksbank C, Budd A, De Las Rivas J, Dreyer J, Fernandes PL, van Gelder C, Jacob J, Jimenez RC, Loveland J, Moran F, Mulder N, Nyrönen T, Rother K, Schneider MV, Attwood TK.

⊕ Author information

Abstract

The mountains of data thrusting from the new landscape of modern high-throughput biology are irrevocably changing biomedical research and creating a near-insatiable demand for training in data management and manipulation and data mining and analysis. Among life scientists, from clinicians to environmental researchers, a common theme is the need not just to use, and gain familiarity with, bioinformatics tools and resources but also to understand their underlying fundamental theoretical and practical concepts. Providing bioinformatics training to empower life scientists to handle and analyse their data efficiently, and progress their research, is a challenge across the globe. Delivering good training goes beyond traditional lectures and resource-centric demos, using interactivity, problem-solving exercises and cooperative learning to substantially enhance training quality and learning outcomes. In this context, this article discusses various pragmatic criteria for identifying training needs and learning objectives, for selecting suitable trainees and trainers, for developing and maintaining training skills and evaluating training quality. Adherence to these criteria may help not only to guide course organizers and trainers on the path towards bioinformatics training excellence but, importantly, also to improve the training experience for life scientists.

Bioinformatics Education

Bioinformatics Training Network (BTN): a community resource for bioinformatics trainers.

Schneider MV[1], Walter P, Blatter MC, Watson J, Brazas MD, Rother K, Budd A, Via A, van Gelder CW, Jacob J, Fernandes P, Nyrönen TH, De Las Rivas J, Blicher T, Jimenez RC, Loveland J, McDowall J, Jones P, Vaughan BW, Lopez R, Attwood TK, Brooksbank C.

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Abstract

Funding bodies are increasingly recognizing the need to provide graduates and researchers with access to short intensive courses in a variety of disciplines, in order both to improve the general skills base and to provide solid foundations on which researchers may build their careers. In response to the development of 'high-throughput biology', the need for training in the field of bioinformatics, in particular, is seeing a resurgence: it has been defined as a key priority by many Institutions and research programmes and is now an important component of many grant proposals. Nevertheless, when it comes to planning and preparing to meet such training needs, tension arises between the reward structures that predominate in the scientific community which compel individuals to publish or perish, and the time that must be devoted to the design, delivery and maintenance of high-quality training materials. Conversely, there is much relevant teaching material and training expertise available worldwide that, were it properly organized, could be exploited by anyone who needs to provide training or needs to set up a new course. To do this, however, the materials would have to be centralized in a database and clearly tagged in relation to target audiences, learning objectives, etc. Ideally, they would also be peer reviewed, and easily and efficiently accessible for downloading. Here, we present the Bioinformatics Training Network (BTN), a new enterprise that has been initiated to address these needs and review it, respectively, to similar initiatives and collections.

Bioinformatics Education

The GOBLET training portal: a global repository of bioinformatics training materials, courses and trainers.

Corpas M[1], Jimenez RC[1], Bongcam-Rudloff E[1], Budd A[1], Brazas MD[1], Fernandes PL[1], Gaeta B[1], van Gelder C[2], Korpelainen E[1], Lewitter F[1], McGrath A[1], MacLean D[1], Palagi PM[1], Rother K[1], Taylor J[1], Via A[1], Watson M[1], Schneider MV[1], Attwood TK[1].

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Abstract

SUMMARY: Rapid technological advances have led to an explosion of biomedical data in recent years. The pace of change has inspired new collaborative approaches for sharing materials and resources to help train life scientists both in the use of cutting-edge bioinformatics tools and databases and in how to analyse and interpret large datasets. A prototype platform for sharing such training resources was recently created by the Bioinformatics Training Network (BTN). Building on this work, we have created a centralized portal for sharing training materials and courses, including a catalogue of trainers and course organizers, and an announcement service for training events. For course organizers, the portal provides opportunities to promote their training events; for trainers, the portal offers an environment for sharing materials, for gaining visibility for their work and promoting their skills; for trainees, it offers a convenient one-stop shop for finding suitable training resources and identifying relevant training events and activities locally and worldwide.

AVAILABILITY AND IMPLEMENTATION: http://mygoblet.org/training-portal.

Bioinformatics Education

GOBLET: the Global Organisation for Bioinformatics Learning, Education and Training.

Attwood TK, Bongcam-Rudloff E[2], Brazas ME[3], Corpas M[4], Gaudet P[5], Lewitter F[6], Mulder N[7], Palagi PM[8], Schneider MV[9], van Gelder CW[10]; GOBLET Consortium.

⊕ Collaborators (54)

⊕ Author information

Erratum in

Correction: GOBLET: The Global Organisation for Bioinformatics Learning, Education and Training. [PLoS Comput Biol. 2015]

Abstract

In recent years, high-throughput technologies have brought big data to the life sciences. The march of progress has been rapid, leaving in its wake a demand for courses in data analysis, data stewardship, computing fundamentals, etc., a need that universities have not yet been able to satisfy--paradoxically, many are actually closing "niche" bioinformatics courses at a time of critical need. The impact of this is being felt across continents, as many students and early-stage researchers are being left without appropriate skills to manage, analyse, and interpret their data with confidence. This situation has galvanised a group of scientists to address the problems on an international scale. For the first time, bioinformatics educators and trainers across the globe have come together to address common needs, rising above institutional and international boundaries to cooperate in sharing bioinformatics training expertise, experience, and resources, aiming to put ad hoc training practices on a more professional footing for the benefit of all.

Bioinformatics Education

Editorial

Ten Simple Rules for Developing a Short Bioinformatics Training Course

Allegra Via[1], Javier De Las Rivas[2], Teresa K. Attwood[3], David Landsman[4], Michelle D. Brazas[5], Jack A. M. Leunissen[6], Anna Tramontano[1], Maria Victoria Schneider[7]*

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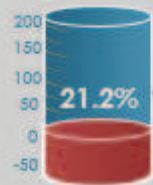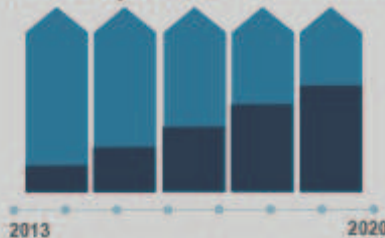
Bioinformatics Education

- **Ten Simple rules** for a short bioinformatics course :

  - Set **Practical and Realistic** Expectations
  - Verify That Trainees' **Expectations** Match Course **Scope**
  - Plan **Exercises and Activities** and Test Resources **before** Delivery
  - Ensure Computational Equipment **Preparedness** and Hands-On Support Availability
  - Use the Dynamic World of Bioinformatics **Resources and Tools** as a Learning Opportunity
  - Balance **Concepts with Practical** Outcomes
  - Reinforce Learning with Contextual and ''Real World Experience'' **Examples**
  - Ensure the Methods/Tools Have **Relevance** to the Trainee Experience and Scientific Research Needs
  - Allow for **Interactivity** and Provide Time for Reflection, Individual Analysis, and Exploration
  - Encourage **Independent** Thinking and Problem Solving

Bioinformatics Education

Global Bioinformatics Market Size and Forecast, 2013 - 2020 ($Million)

Outcome

- Market : Career opportunities
- Profile
- Core competencies
    - Study level (Bachelor, Master, PhD)
- Training ressources
    - Astro training network
    - Society task force on Education
    - Platforms for shared ressources
- Strong support of institutions
    - Different levels : Politics, Univ., …