


[Objectives](#)
[Contents](#)
[Schedule](#)
[Eligibility ⁱⁱ](#)
[Application Procedure](#)

The application deadline is 18th May 2007.

[Application Form](#)

Rationale.

Infectious diseases transmitted by insects (malaria, dengue, yellow fever, leishmaniasis and Chagas) are the leading cause of mortality in developing countries in Africa, Asia and Latin America. Despite efforts to control these diseases, little progress has been made in terms of elucidating the molecular mechanisms of transmission, resistance to insecticides, drug resistance in patients and life cycles of these disease causing agents.

Transmission of these diseases requires an effective combination between agent and vector including protein interactions, specific metabolites, etc. The mechanism of transmission and disease development is complex and it varies among species as well as agents in the three continents. Species that are geographically distant share enough similarities in their genomes that extrapolation can be used to approach similar problems. Parasites involved in the transmission of these diseases have developed resistance to the available drugs in the Latin American, Asian and African continents and the need for new alternatives to prevent their transmission and development is immediate. The vectors that transmit these diseases have also evolved to rapidly adapt to the available pesticide treatments, proximity to humans, climatic conditions, etc.

Young scientists in tropical countries in Africa, Asia and Latin America are familiar not only with the diseases but also with the vectors and the parasites that transmit them and in this respect their knowledge is invaluable and unique. Unfortunately, the lack of knowledge in bioinformatics, genomics and proteomics has slowed down the progress of research in the area of medical entomology. In this era of globalization, we should take advantage of resources in all three continents to develop new strategies to fight insect transmitted diseases. Scientists should be educated and trained early in their careers to establish self-sustainable functional genomics/proteomics projects. They should also be provided with the skills necessary to ensure that their acquired knowledge is transferred to the next generation of graduates and among themselves through networking and collaborations.

Objectives

1. To train young scientists in functional genomics/proteomics and bioinformatics to create mentors for the next generation of researchers making these programs self-sustainable.
2. To provide the skills and knowledge necessary to develop self-sustainable bioinformatics and functional genomics/proteomics programs aimed at infectious diseases transmitted by insect vectors.
3. To develop a network of researchers involved in prevention, detection, diagnostics and therapeutics of infectious diseases transmitted by insect vectors in Latin America by fostering collaborations with existing functional genomics program participants in Africa and to facilitate a network of research collaborations between leading international institutions in Europe and the United States with higher education institutions in Latin America.

General Course contents:

The course will be an intensive two week course with workshop/lectures in the morning and laboratory practices (including computer practices) in the afternoon. Each participant will be assigned an experienced mentor overseas and a colleague in Africa. A networking session parallel to the course will be scheduled with the intention to exchange scientific ideas. During the course, participants will be

encouraged to share their scientific experiences in their respective fields as well as any difficulties they might have encountered to execute their research in person with their classmates and faculty in the course. Communications with mentors overseas will be carried out through internet communication (email, instant messenger, etc). Participants will be expected to complete homework assignments during the duration of the course as well as a small grant proposal relevant to their work.

Lectures and practical sessions will cover the following topics:

- Nucleic acid based techniques: PCR, RT-PCR, Real time PCR, gel electrophoresis, etc.
- Proteins based techniques; SDS-PAGE, 2D gel electrophoresis, Western blots, peptide sequencing by LCMS/MS (mass spectrometry), etc.
- In vitro and *In vivo* insecticide resistance tests.
- Phylogenetic studies and basic of statistical analysis and experimental design.
- Bioinformatic tools applied to insect vector diseases and to pharmacology
- Participants will be required to write a brief research proposal (6 pages) at the end of the course addressing a particular problem in their respective home countries in NIH format (rationale, specific aims, methods, preliminary results (if any) and references) applying the knowledge and skills acquired during their training.

Schedule:

DAY 1 Monday June 18th

Registration, welcome breakfast reception

Overview of the course

Lecture: Introduction to bioinformatics and genome resources (*Homo sapiens*, *Anopheles gambiae*, *Drosophila melanogaster*, *Aedes aegypti*, *Leishmania major* and *Plasmodium falciparum* genomes)

Coffee break (refreshments provided)

Lecture: Introduction to PCR, RT-PCR, primer design software, real time PCR applied to vectors and parasites of medical importance

Lunch (provided)

Wet laboratory practice 1 (PCR and RT-PCR)

DAY 2 Tuesday June 19th

Lecture: Gel extraction, cloning, ligation, bacterial transformations, cDNA libraries, RACE, DNA sequencing

Sequence data base searching / practical exercise using: NCBI, ENSEMBL, ANOBASE, ANOXCEL and genecards

Coffee break (refreshments provided)

Lecture: Sequence homology analysis, pairwise sequence alignment.
Transcript analysis practical exercise (ORF-introns-exons-start/stop codons).

Lunch (provided)

Wet laboratory practice 2 (continuation of lab practice 1; nucleic acid purification and cloning, gel extraction, ligation into plasmids and bacterial cultures)

DAY 3 Wednesday June 20th

Computer hands-on lecture: Microarray analysis, validation (by realtime PCR, *in situ* hybridization, RNAi, etc), GEO data sets.

Coffee break (refreshments provided)

Lecture: Multiple sequence alignments, algorithms, scoring matrices

Lunch (provided)

Computer hands-on lecture: DNA sequence analysis (sequences provided to each participant) using Vecscreen, home and web-based BLAST, FASTA, ENSEMBL.

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DAY 4 Thursday June 21st

Lecture: RNA interference
Gene knockouts, transgenesis in insects
Molecular markers, green fluorescent protein

Coffee break (refreshments provided)

Lecture: PCR and RT-PCR in insecticide resistance

Lunch (provided)

Wet laboratory practice 3 (real time PCR)

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DAY 5 Friday June 22nd

Lecture: Molecular tools applications: Characterization of *Plasmodium* infected blood meals
Grant application part 1: Introduction to grant proposals and manuscript preparation

Coffee break (refreshments provided)

Lecture: *In silico* and *in vivo* methods for site directed mutagenesis

Lunch (provided)

Computer hands-on lecture: Molecular phylogeny and phylogenetic trees

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DAY 6 Saturday June 23rd

Lecture: Principles of protein structure, EXPASSY, SWISSPROT, PFAM, secondary structure analysis and prediction

Coffee break (refreshments provided)

Lecture: Sequence pre-processing, pipe line construction
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Lunch (provided)

Lecture and practical exercise: Sequence annotation
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DAY 7 Sunday June 24th

Free day

DAY 8 Monday June 25th

Computer hands-on lecture: Cloning and recombinant protein purification
SDS-PAGE, isoelectric focusing and 2D gel electrophoresis

Coffee break (refreshments provided)

Lectura: LC-MS/MS and intro to protein analysis by MS.

Lunch (provided)

Wet laboratory practice 4 (RNA interference applied to Western Blots)

DAY 9 Tuesday June 26th

Lecture: Chemical modeling applied to inhibitors, drugs and pesticide design
Grant application part 2: online resources

Coffee break (refreshments provided)

Lecture: Insecticide and pesticide analysis and testing

Lunch (provided)

Wet laboratory practice 5 (*in vivo* insecticide testing in an insect model)

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DAY 10 Wednesday June 27th

Lecture: Characterization of insecticide resistance at the genomic level
Â (a *hypothetical insecticide resistance case*)

Coffee break (refreshments provided)

Lecture: Understanding host-vector interactions at the molecular level
Understanding vector-parasite interactions at the molecular level

Lunch (provided)

Grant proposal (This time will be used to complete work on grant proposal and submission. Students are highly encouraged to contact their advisors for online help during this session).

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DAY 11 Thursday June 28th

Lecture: Modeling protein interactions and metabolons

Coffee break (refreshments provided)

Proposal submission to mentors

Lunch (provided)

Computer hands-on lecture: Exercises on protein structure, prediction and ligand-protein interactions

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DAY 12 Friday June 29th

Lecture: Pharmacology and drug development using bioinformatics:
From DNA sequence to drugs
From protein sequence to drugs
From design to clinical trials

Coffee break (refreshments provided)

Lecture: From drugs to patents

Lunch (provided)

Lecture: Â Functional genomic courses in other continents: The MRTC in Mali as an example of a successful program

DAY 13 Saturday June 30th

Lecture: Mechanisms of drug resistance
Analysis of a hypothetical drug development and resistance case using the tools provided in this course

Coffee break (refreshments provided)

Lecture: Protein MS identification and high throughput analysis of complex protein mixtures

Lunch (provided)

Interactive round-table discussion and grant proposal review of grants submitted.

Course review and evaluation.

Eligibility.

The course is geared to advanced PhD trainees and early career postdocs **FROM LATINAMERICA**, fluent in english and active in entomological medical research with demonstrated basic computer skills and background in molecular biology.

Number of Participants.

Twenty participants will be selected to attend the course. The participants will be selected on a competitive basis and will receive full support from TDR and PECET which includes round-trip airfare (economy class) between hometowns and the workshop venue, accommodation and training materials. **We anticipate a large number of applications therefore, the selection process will be highly competitive and only students with demonstrated credentials will be selected.**

Selection criteria.

Students will be selected by their research potential in terms of publications, demonstrated knowledge of basic bioinformatics and genomics/proteomics techniques as evidenced by their CV and letters of recommendation. The need for financial assistance (travel and accommodations) will also be evaluated. Fluency in English is mandatory.

Registration Fee: The workshop is sponsored by TDR/WHO and the PECET. There is no registration fee.

Financial support: Participants will be provided round trip airfare, hotel accommodations and meals for the duration of the two week course. Transportation from the hotel to the PECET and to and from the airport will also be provided at no cost to all participants. Stops between cities, alternative routes, meals and accommodations during the trip, will not be reimbursed. There will be no financial assistance with costs incurred once the course has ended or prior to day one or with any other costs associated with participation (gratuities, vaccinations, taxi fares, notebooks, CD's, flashdrives, etc). Participants will be entirely responsible for assuming the cost of vaccinations, passports, documents and other expenses they might incur as a result of traveling to Colombia. Please check with the corresponding authorities in your country to verify the requirements regarding vaccinations and visas. Changes in ticket dates and accommodations will be the participant's responsibility. Penalties due to changes in ticket schedule will not be reimbursed unless the change is due to illness or a major catastrophic event.

Venue: Programa de Estudio y Control de Enfermedades Tropicales-PECET Universidad de Antioquia. Medellin-Colombia.

Course language: English. Applicants must be able to understand, read, write and speak English fluently.

Application Procedure:

Applicants **MUST** complete the application form available in the course website at

http://medicina.udea.edu.co/pecet/Training/index_files/appli.doc

Application Form

All applications **MUST BE** send to the e-mails provided on the application form along with the recommendation letters on PDF (paper applications will not be accepted).

In addition, the participants must provide three letters of recommendation from their Ph.D. advisor (or principal investigator) and from two more established researchers in their field of expertise and familiar with the applicant's research and skills. Each letter should indicate the qualifications of the participant as well as a brief summary of how the participant will use the tools obtained during the course in the immediate future. In addition, the student's advisor should express their approval for participation in the course. Finally, the need for financial aid in order to apply for travel, accommodations and meal funds to attend this course must also be demonstrated in the letters.

Letters should be sent by email to: pecet@siu.udea.edu.co by the application deadline.

The application deadline is 18th May 2007.

Further Information: Please send any question or inquiries to:

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Or

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Important Dates:

Course announcement: April 15th, 2007.
Application Deadline: May 18th 2007.
Notification of acceptance: May -- 2007.
Deadline to confirm attendance: May 20th 2007.
Course Dates: June 18-30, 2007.



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