

## **Implementation memory of the PhD of Aquatic resource diversity and conservation**

### **A. GENERAL AND ORGANITZATIONAL ASPECTS**

1. Denomination of the study  
**Aquatic resource management**

2. General organization

**Institution or institutions:** Can Tho University

**Study regime (full time/partial time):** Full time

**Modality (on-site, on-line, mixt):** On-site

**Complete time:** 3 years

**Training period (annual, half-yearly, quarterly):** annual

**Credits number to be achieved:** 90

**Language:** Vietnamese

**Professional prospects (research, professional, mixt):** mixt

3. Objectives

To train the PhD students to obtain (i) broad and holistic knowledge on the area of Aquatic biodiversity and conservation; (ii) proactive, creative and independent thinking; (iii) capability to lead and manage research activities; (iv) ability to solve specialized issues at national and international scales/levels.

4. Outcomes

- Obtain comprehensive and holistic knowledge on management and protection of aquatic resources in linkage of conservation and development of aquatic resources;
- Master firmly broad and deep knowledge on aquatic biodiversity and conservation;
- Develop new thinking in organizing specialization and research activities to solve necessary problems in the field of aquatic biodiversity and conservation;
- Obtain holistic knowledge on laws, management and protection of environment, especially biodiversity and aquatic resources;
- Detect and analyse sophisticated problems and propose creative recommendations for solving these problems; to create new knowledge from dissertation expertise and aquatic biodiversity and conservation;
- Write scientific papers and reports; rise own point of view on issues of specialization;



- Establish and take part in national and international collaborative networks for specialization activities;
- Synthesize collective thought and lead in expertise to solve problems at national and international levels;
- Adapt well to global integration working environment; be capable of leading and influencing to the strategic orientation of the organization;
- Be capable of decision making on planning, management of research activities, knowledge development, creation and new process.

## 5. Admission

**Maximum number of students: 5**

**Admission and selection criteria or merits assessment:**

- Graduated from fields of Aquatic resource management; Fishing technology; Aquaculture; Fish pathology. Other fields related to Aquatic resource diversity and conservation will be considered based on academic performance of undergraduate level.
- Candidates have to be qualified in English with IETLS of 5 and be an author or co-author of a published paper in the related fields.

**Previous studies acknowledgement:**

Aquatic resource management, Fishing technology, Aquaculture, Fish pathology, Ecology

## **B. JUSTIFICATION**

### **1. Comparability of the qualification in the international context**

High qualified human resources are definitely at high demand especially under conditions of rapidly growing economics. In addition due to the rapid development from agriculture, aquaculture, industry, etc... stress are also increasingly formulated and threatening the environment in which natural resources are the most vulnerable targets. Aquatic resources have been playing an important role in the development of a region, especially livelihood of millions people who are living nearby and one of the most damaging source. Many impacts from uncontrolled development such as pollution, habitat alternation, overfishing... are the most critical factor causing dramatic decline of the resources. Protection and conservation of the resources are very indispensable to sustain the environment. Higher qualified human resources are needed in order to handle such a challenge especially in combination with global climate change.

The PhD curriculum of Aquatic resource diversity and conservation was formulated to meet that demand. Many PhD programs in aquatic biodiversity have been formulated to offer opportunities for students to enhance their capacity in finding principles, mechanisms and solutions to protect the resources. This program has also been examined under support of University of Girona. Therefore, the curriculum is not only relevant to the conditions of the Mekong Delta and Vietnam but also meet global

requirement, especially in the region. Students from the Mekong River riparian can apply to pursue this program.

## 2. Internal academic referent

### a. Relationship with other existent degrees with official character:

Master program in Aquatic resources management has been operated since 2010 and graduates from this MSc program can be certainly candidates of this PhD program. The PhD program in Aquatic resources management is under developed and will be offering shortly in the coming time. In addition, outputs of the traditional MSc program in Aquaculture would be also the inputs of this program.

At the BSc level, the same fields with MSc levels are also offered. With current regulation, students graduated from BSc level but qualified with great distinction grade can go straight to PhD level.

### b. Existent offer in CTU of similar programmes:

- BSc. in Aquatic resource management
- BSc. in Natural resource and environment management
- BSc in Aquaculture
- MSc. in Aquatic resource management
- MSc. in Natural resource and environment management
- MSc in Aquaculture
- MSc. in Ecology

### c. Research lines that supports the programme:

The research groups of the CONSEA Universities supporting this initiative are:

Research group code	Research group name	Number of members	Number of projects*	Number of agreements*
CTU Aquatic resources	Aquatic Resources, Biodiversity, Taxonomy	6	7	5
CTU Aquatic environment and ecology	Aquatic Environment Monitoring, Ecology, Aquatic invertebrates	10	8	6
CTU Environment and natural resources	Environment, Natural resources, Modelling, Remote sensing	10	8	7

## 3. Society needs (demand)



Under many anthropogenic impacts including overfishing, pollution, habitat alternation, invasive species the aquatic resources have been dramatically declined. Management, protection and conservation of the resources are extremely indispensable. Highly qualified human resources who are able to initiate, create, and direct all activities related to protection and conservation of the resources are highly demanded.

#### 4. Potential source of students

PhD students recruited for this program can be the ones who have graduated from MSc. programs (Aquatic resource management, Aquaculture, Ecology) or directly from the same fields BSc. programs. The other sources are from staff who is working in the governmental and non-governmental organizations, from universities and research institutes.

### C. ACADEMIC ASPECTS

#### 1. Training goals of the study: competences profile

##### a. Characteristics and objectives of the degree

The PhD program in Aquatic resource diversity and conservation was formulated in the framework of the project “Developing curricula for Environmental safety and Conservation of the Biodiversity in South-East Asia” (CONSEA) with support from University of Toulouse III-Paul Sabatier (France), University of Gent (Belgium), University of Girona (Spain) and University of Natural Resources and Life Sciences (BOKU –Austria). The programme is designed to provide students with an interdisciplinary education emphasizing in aquatic resource biodiversity and conservation at deeper and broader levels. The PhD students are supplemented with knowledge on applied biotechnology in aquatic resources, efficient tool in resource management and conservation and research topics which lead them to be able to be proactive and initiative in the practice.

##### b. Target groups /audience

- Graduate students holding MSc. degree in related fields of study
- Qualified graduate students holding BSc. degree in related fields of study
- Staff from governmental organizations working in the same fields
- Staff from non-organizations who are working on biodiversity and conservation areas
- Others who are interest in the program

##### c. Output profile of the graduates

After graduation, students are capable to work independently with different positions such as leader, manager, officer in governmental or non-governmental organizations; researcher or lecturer on biodiversity conservation, aquatic resources of national or international institutions.



#### **d. Competences explanation**

##### **i. Transversal competences (general)**

- Ability to analyse and synthesis
- Ability to analyse and assess
- Ability to analyse and apply
- Ability to organize and direct
- Ability decide and manage
- Ability to criticize
- Ability to review
- Ability to manage and plan
- Decision making
- Skills of communication
- Team working

##### **ii. Specific competences**

- Analysing data
- Interpreting data
- Comparing data
- Managing data
- Writing paper
- Publishing research results
- Wiring research proposals
- Design and establish a protected area
- Plan and conduct a specific activity related to the study field
- Integrate working with other teams

#### **2. Curricular structure**

The curriculum contains 90 credits in which 12 credits of course work and the rest are research work. Among 12 theoretical credits, 8 are compulsory and 4 are elective. The research work consists of 9 credits of literature review (1 overview and 2 specialized topics), 13 credits for publication (2 papers – 8 credits) and conference attendance (5 credits), 5 credits for seminar, 7 credits for teaching assistance or MSc thesis guidance, 8 credits for English proficiency and 36 credits for conducting research.

#### **3. Professors profile (expertise)**

See below

#### **4. Envisage measures for students mobilities**

Under the CONSEA project, PhD students will have chances to go to one of the European universities including University of Toulouse III-Paul Sabatier (France),



University of Gent (Belgium), University of Girona (Spain) and University of Natural Resources and Life Sciences (BOKU –Austria).

5. Envisage of possible collaborations with other professionals and researches that not will hold the professor status.

#### D. Courses Description of PhD programme in Aquatic resource diversity and conservation

Code	Course Title	Credits	Hours
<b>A. Course Work</b>			
<b>1). Compulsory courses (8 credits)</b>			
TSQ901	Applied biotechnology in aquatic resources management	2	30
TSQ902	Aquatic resources and climate change	2	30
TSQ903	Applied statistic and scientific writing	2	30
TSQ904	Modelling in aquatic resources management	2	30
<b>2). Elective courses (4 credits)</b>			
TSQ905	Marine resources conservation and development	2	30
TSQ906	Aquatic environment assessment	2	30
TSQ907	Fish population dynamics	2	30
TSQ908	Bio-indicators and application	2	30
<b>3). Specialized topics (9 credits)</b>			
	Literature overview	3	45
	Topic 1	3	45
	Topic 2	3	45
<b>B. Research Work (69 credits)</b>			
	Research proposal	20	300
	Publication	9	240
	Conference	5	150
	Workshop	5	150
	Thesis writing	30	450
<b>Total (I + II)</b>		<b>90</b>	

#### A: Course Work

##### 1). Oriented courses

#### TSQ901 APPLIED BIOTECHNOLOGY IN AQUATIC RESOURCES MANAGEMENT

##### Course Description



The course will provide knowledge on biotechnology and tools for protecting, managing and conserving the aquatic resources. Genetic techniques and marking or tagging technology will be introduced and practiced as helpful technique and tools to track migratory path or assessing the fragmentation or disconnectivity of aquatic populations. Measures for protection, management and conservation of the resources will be proposed and applied accordingly.

#### **Learning Outcomes:**

- Master firmly principles of applied biotechnology in aquatic resources management
- Understand broadly techniques used in assessing the resources
- Apply biotechnology in protecting, managing and conserving the resources
- Generate appropriate methods for aquatic resource protection and management

#### **Competences**

- Select and handle well biotechnology tools for assessing and managing aquatic resources
- Propose and design plan for applying biotechnology in assessing and managing aquatic resources
- Instruct the application of tools in assessing and managing aquatic resources

#### **Teaching methods:**

Teaching methods include lecturing and presentation. After lecturing the core issues of the course, each student must presents 1-2 topics related to the course. Discussion is encouraged during class to exert more understanding about the course and interactions among students, materials, and teacher.

#### **Assessment methods:**

The grading will be based on follows:

- Debate ability (10%)
- Presentation/Seminar (30%)
- Final exam (60%)

Module cumulative GPA is calculated by sum of units and to one decimal place then transferred into mark in word and 4.0 GPA (one decimal place) following Can Tho University's Academic Rules.

#### **Teachers' profile**

**Duong Thuy Yen**, PhD, Associate Professor

- Working institution: College of Aquaculture and Fisheries, Can Tho University (Vietnam)
- Contacts: [thuuyen@ctu.edu.vn](mailto:thuuyen@ctu.edu.vn); Tel: +84 907526845



- Qualification: PhD in Fisheries and Wildlife, Ecology, Evolutionary Biology and Behavior
- Teaching fields: Genetics
- Research fields: Genetic population of fish, DNA barcoding
- Recent publications:
  - Duong TY, Scribner KT, Kanefsky J, Na-Nakorn U., 2017. Lack of introgressive hybridization by North African catfish (*Clarias gariepinus*) in native Vietnamese bighead catfish (*Clarias macrocephalus*) populations as revealed by novel nuclear and mitochondrial markers. *Aquaculture*, 473: 468–477.
  - Duong TY, Nguyen TT, Pham TL., 2017. Morphological differentiation among cultured and wild *Clarias macrocephalus*, *C. macrocephalus* x *C. gariepinus* hybrids, and their parental species in the Mekong delta, Viet Nam. *International Journal of Fisheries and Aquatic Studies*, 5: 233–240.
  - Ayesha I, Duong TY, Siti AMN, Darlina MN., 2016. Molecular identification of commercially important species of *Nemipterus* (Perciformes: Nemipteridae) in surrounding seas of Malaysia. *Biodiversitas*, 17 (2): 571-577
  - Nguyen TNT and Duong TY., 2016. Morphological and genetic differences between cultured and wild populations of *Channa striata* in Viet Nam and its phylogenetic relationship with other *Channa* species. *Songklanakarin Journal of Science and Technology*, Thailand 38 (4) 427-434
  - Duong TY., 2015. Differentiation of two *Clarias* species (*Clarias macrocephalus* and *C. gariepinus*) and their hybrids based on PCR-RFLP analysis. *Journal of Science and Development, Vietnam*, 6: 904-912
  - Duong TY, Liem PT, Ky H., Hai TN., 2013. Strain evaluation of giant freshwater prawn (*Macrobrachium rosenbergii*) based on morphology and genetic diversity. *The proceedings of the International Fisheries Symposium, Vietnam, 6-8th December, 2012*, 239-244.
  - Duong TY, Scribner KT, Forsythe PS, Crossman JA, Baker EA., 2013. Interannual variation in effective number of breeders and estimation of effective population size in long-lived iteroparous lake sturgeon (*Acipenser fulvescens*). *Molecular Ecology* 22: 1282-94.
  - Duong TY, Scribner KT, Crossman J, Forsythe P, Baker E, Kanefsky J, Homola J, Davis C., 2011. Relative larval loss among females during dispersal of Lake Sturgeon (*Acipenser fulvescens*). *Environmental Biology of Fishes* 91: 459–69

### Languages

Vietnamese and English

## TSQ902 AQUATIC RESOURCES AND CLIMATE CHANGE

### Course Description

The course will provide knowledge on aquatic resources including diversity of vertebrates (fish, amphibians, mammals, reptiles, birds), invertebrates (crustaceans, molluscs, cnidarians,...) and plants (micro algae, seaweed, sea grass...), their





importance and roles; impacts of climate changes on the resources, measures for mitigation of the impacts...

### **Learning Outcomes:**

- Master firmly aquatic resources, their diversity and importance
- Master firmly the impacts of climate changes on aquatic resources
- Master firmly possible climate change impact mitigation measures

### **Competences**

- Identify the important aquatic species
- Determine single impact of climate change on important aquatic species
- Apply possible measures to mitigate the impacts of climate change on aquatic resources
- Propose possible measures to mitigate the impacts of climate change on aquatic resources

### **Teaching methods:**

- Class lectures
- Group discussion
- Presentation

### **Assessment methods:**

- Attendance (5%)
- Work assignment (presentation/discussion) (15%)
- Lab work (30%)
- Final exam (Compulsory) (50%)

Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place. Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

### **Teachers' profile**

#### **Vu Ngoc Ut, PhD and Associate professor**

- Working institution: College of Aquaculture and Fisheries, Can Tho University (Vietnam)
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- Qualification: MSc in Aquaculture from Gent University (1997); PhD in Applied marine biology from University of Wales Bangor, UK (2003).
- Teaching fields: Aquatic ecology, Aquatic invertebrates, Aquatic biodiversity and conservation, Aquatic bio-monitoring
- Research fields: Biodiversity, Water quality, Bio-monitoring, Live food production
- Recent publications:



- Ut, V.N., Giang, H.T., Phu, T.Q., Morales, J. and Phuong, N.T. (2016). Assessment of water quality in catfish (*Pangasianodon hypophthalmus*) production systems in the Mekong Delta. *Can Tho University Journal of Science*. Vol 3: 71-78.
- Vu Ngoc Ut, Au Van Hoa & Nguyen Bach Loan (2015). Diversity of fish Hau river, Mekong Delta, Vietnam. *Journal of Fisheries and Technology*, Nha Trang University. Special issue-2015:167-174.
- Vu Ngoc Ut, Nguyen Ba Quoc & Son Sam Phone (2014). Assessment of water quality in shrimp culture areas in the Mekong Delta. *Journal of Agricultural Science and Technology B*, 4: 571-580.
- Vu Ngoc Ut and Tran Thi Kieu Trang (2014). Species composition and fishing status of cephalopods resources in Ha Tien sea, Kien Giang province. *Proceedings of National Conference on Marine Biology and Sustainable Development*, p: 329-336. In Vietnamese.
- Nguyen Thi Kim Lien, Huynh Truong Giang and Vu Ngoc Ut (2014). Zoobenthos composition in Hau River. *Journal of Science*, Can Tho University, 2: 239-247. In Vietnamese.
- Vu Ngoc Ut & To Cong Tam (2013). Species compositions and fishing status of seahorses (*Hippocampus* spp.) in Phu Quoc Island, Vietnam. *Proceedings of the International Conference on “Bien Dong 2012”*, p. 36-45.
- Nguyen Thi Kim Lien, Huynh Truong Giang and Vu Ngoc Ut (2013). Zooplankton biodiversity in the Cu Lao Dung mangrove, Soc Trang province. *Journal of Science*, Can Tho University, vol. 25: 149-157. In Vietnamese.
- Nguyen Tho, Roel Mercks and Vu Ngoc Ut (2013). Impacts of saline water irrigation and shrimp pond discharges on the surrounding waters of a coastal district in the Mekong delta of Vietnam. *Environmental Earth Sciences*. DOI:10.1007/s12665-013-2603-9.
- Au Van Hoa, Nguyen van Thuong and Vu Ngoc Ut (2013). Species composition and production of Palaemonid and Penaeid shirmp in Hau River. *Proceeding of National Scientific Conference for youth on fisheries*, pp. 566-574. In Vietnamese.

### Teachers' profile

#### Tran Dac Dinh, PhD and Associate Professor

- Working institution: College of Aquaculture and Fisheries, Can Tho University (Vietnam)
- Contacts: [tddinh@ctu.edu.vn](mailto:tddinh@ctu.edu.vn)
- Qualification: PhD in Fish Population Dynamics at University Malaysia Terengganu
- Teaching fields: Fishing Technology and Fish Stock Assessment and Management



- Research fields: Fishing Technology and Fish Stock Assessment and Management
- Recent publications:
  - Quang Minh Dinh, Y Nhu Phan and **Dinh Dac Tran** (2017) Population biology of the goby *Glossogobius giuris* (Hamilton, 1822) caught in the Mekong Delta, Vietnam. *Asian Fisheries Sciences*, 30 (2017): 26-37.
  - Le Nguyen Ngoc Thao, **Tran Dac Dinh** and Duong Thuy Yen (2017) Exploitation status of bighead catfish (*Clarias macrocephalus*) in the Mekong Delta. *Scientific Journal of Can Tho University*, 48b: 18-26.
  - Huynh Van Hien, **Tran Dac Dinh**, Nguyen Duy Can and Dang Thi Phuong (2017) Analysis of livelihood of Gillnet households fishing coastal areas (<90CV) in Phu Quoc District, Kien Giang Province. *Journal of Economics and Management Science*, 2: 81-90.
  - Yuichi Kano, David Dudgeon, So Nam, Hiromitsu Samejima, Katsutoshi Watanabe, Chaiwut Grudpan, Jarungjit Grudpan, Wichan Magtoon, Prachya Musikasinthorn, Phuong Thanh Nguyen, Bounthob Praxaysonbath, Tomoyuki Sato, Koichi Shibukawa, Yukihiro Shimatani, Apinun Suvarnaraksha, Wataru Tanaka, Phanara Thach, **Dac Dinh Tran**, Tomomi Yamashita, Kenzo Utsugi (2016) Impacts of Dams and Global Warming on Fish Biodiversity in the Indo-Burma Hotspot. *PLoS ONE* 11(8): e0160151. doi:10.1371/journal.pone.0160151.
  - Duong Thuy Yen, Nguyen Kiet, Bui Son Nen, Nguyen Van Thuong, Nguyen Bach Loan and **Tran Dac Dinh** (2016) DNA barcodes and morphology of *P. krempfi*, *P. mekongensis*, and *P. elongatus*. *Journal of Biotechnology*, 14(1): 29-37 pp.
  - Dinh, Quang M., Jian G. Qin, and **Dac D. Tran** (2015) Population and Age Structure of the Goby *Parapocryptes serperaster* (Richardson, 1864; Gobiidae: Oxudercinae) in the Mekong Delta. *Turkish Journal of Fisheries and Aquatic Sciences*, 15: 345-357.
  - Diep Anh Tuan, Dinh Minh Quang and **Tran Dac Dinh** (2014) Species composition of Gobiidae distributed in the coastal areas, Soc Trang Province. *Journal of Science, Ha Noi National University*, 30(3):68-76.
  - Quang Minh Dinh, Jian Guang Qin, Sabine Dittmann, and **Dinh Dac Tran** (2014) Burrow morphology and utilization of the goby (*Parapocryptes serperaster*) in the Mekong Delta, Vietnam. *Ichthyological Research*, 61: 332-340.
  - Nguyen Minh Tuan and **Tran Dac Dinh** (2014) Species composition of Gobiidae, Eleotridae and some biological aspects of *Glossogobius aureus* Akihito & Meguro, 1975 distributed in the coastal areas of Bentre province, Mekong Delta, Vietnam. Paper presented in the 4<sup>th</sup> International Fisheries Symposium, 30–31<sup>th</sup> October 2014, Surabaya, Indonesia.



- Tran, D.D., K. Shibukawa, P.T. Nguyen, H.P. Ha, L.X., Tran, H.V, Mai and K. Utsugi (2013) Fishes of the Mekong Delta, Vietnam. Can Tho University Publishing House, 174 pages.
- Yuichi Kano, Mohad Shalahuddin Adnan, Chaiwut Grudpan, Jarungjit Grudpan, Wichan Magtoon, Prachya Musikasinthorn, Yoshihiro Natori, Stefan Ottomanski, Bounthob Praxaysonbath, Koneouma Phongsa, Achariya Rangsiruji, Koichi Shibukawa, Yukihiro Shimatani, Nam So, Apinun Suvarnaraksha, Phanara Thach, Phuong Nguyen Thanh, **Dac Dinh Tran**, Kenzo Utsugi and Tomomi Yamashita (2013) An online database on freshwater fish diversity and distribution in Mainland Southeast Asia. Ichthyological Research, Springer, DOI 10.1007/s10228-013-0349-8.
- Nguyen Minh Tuan, **Tran Dac Dinh**, Nguyen Hoai Anh, Tran Trung Kien and Vo Hoang Lam Truc (2013) The species composition of goby (Gobiidae and Eleotridae) and some feeding, reproductive biology characteristics of the goby *Boleophthalmus boddarti* (Pallas, 1770), in the Ben Tre coastal areas. Science and Technology Journal of Agriculture and Rural Development (ISSN:1859-4581), 12/2013: 175-1782.

## Languages

Vietnamese and English

## TSQ903 APPLIED STATISTIC AND SCIENTIFIC WRITING

### Course Description

The aims of this course are to provide methodology and skills on data analysis and scientific paper writing to help PhD students complete their research and dissertation and able to instruct other students and manipulate proficiently the data in their future careers.

### Learning Outcomes:

- Master methodology for statistical analysis
- Understand principles of scientific research;
- Analyse well data
- Understand correct ways to review and to cite scientific literature
- Apply principles in experimental design and statistical analysis

### Competences

- Design well experiments
- Treat proficiently data
- Arrange data scientifically
- Write professionally a scientific paper and thesis
- Present research results at conference and thesis defense
- Analyze data using common statistical software



### Teaching methods:

- Lecture (theory)
- Computer Lab and take home exercises

### Assessment methods:

- Lab exam (25%)
- Midterm exam (15%)
- Final exam (60%)

Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place. Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 then converted to A-B-C-D score based on the academic provisions of the University.

### Teachers' profile

#### Nguyen Thanh Phuong, PhD, Professor

- Working institution: College of Aquaculture and Fisheries, Can Tho University (Vietnam)
- Contacts: [ntphuong@ctu.edu.vn](mailto:ntphuong@ctu.edu.vn)
- Qualification: MSc. in Aquaculture at Asian Institute of Technology and PhD in Agricultural Sciences (specialized in Aquaculture) from Institut Nationale Polytechnique de Toulouse, France.
- Teaching fields: Principles in Aquaculture, Scientific research methodology, Marine aquaculture
- Research fields: Marine species farming, aquaculture and fisheries under climate changes, fish nutrition, fish physiology, bio-active plant products for aquaculture....
- Recent publications:
  - Le Thi Hong Gam, Frank Bo Jensen, Christian Damsgaar, Do Thi Thanh Huong, **Nguyen Thanh Phuong**, Mark Bayley (2017). Extreme nitrite tolerance in the clown knifefish *Chitala ornata* is linked to up-regulation of methaemoglobin reductase activity. *Aquatic Toxicology* 187 (2017) 9–17.
  - Matthew D Regan, Andy J Turko, Joseph Heras, Mads Kuhlmann Andersen, Sjannie Lefevre, Tobias Wang, Mark Bayley, Colin J Brauner, Thi Thanh Huong, **Nguyen Thanh Phuong**, E Nilsson (2016). Ambient CO<sub>2</sub>, fish behaviour and altered GABAergic neurotransmission: exploring the mechanism of CO<sub>2</sub>-altered behaviour by taking a hypercapnia dweller down to low CO<sub>2</sub> levels. *Journal of Experimental Biology* 01/2016; 219(1). DOI:10.1242/jeb.131375
  - Nguyen Thi Ngoc Hon, Tran Thi Tuyet Hoa, Nguyen Quoc Thinh, Atsushi Hinenoya, Tatsuya Nakayama, Kazuo Harada, Megumi



- Asayama, Minae Warisaya, Kazumasa Hirata, **Nguyen Thanh Phuong**, Yoshimasa Yamamoto (2016). Spread of Antibiotic and Antimicrobial Susceptibility of ESBL-Producing *Escherichia coli* Isolated from Wild and Cultured Fish in the Mekong Delta, Vietnam. *Fish Pathology* 01/2016; 51 (Special-issue). DOI:10.3147/jsfp.51.S75
- Yuichi Kano, David Dudgeon, So Nam, Hiromitsu Samejima, Katsutoshi Watanabe, Chaiwut Grudpan, Jarungjit Grudpan, Wichan Magtoon, Prachya Musikasinthorn, **Phuong Thanh Nguyen**, Bounthob Praxaysonbath, Tomoyuki Sato, Koichi Shibukawa, Yukihiko Shimatani, Apinun Suvarnaraksha, Wataru Tanaka, Phanara Thach, Dac Dinh Tran, Tomomi Yamashita, Kenzo Utsugi (2016). Impacts of Dams and Global Warming on Fish Biodiversity in the Indo-Burma Hotspot. *PLoS ONE* 08/2016; 11(8). DOI:10.1371/journal.pone.0160151
  - Le Quoc Viet, Tran Ngoc Hai, **Nguyen Thanh Phuong** (2015). Technical aspects and economic benefits of the juvenile crab nursery in lining tank in Nam Can district, Ca Mau province. *Journal of Marine Science and Technology*. 09/2015; 15(3). DOI:10.15625/1859-3097/15/3/5780
  - Margot Andrieu, Andreu Rico, Tran Minh Phu, Do Thi Thanh Huong, **Nguyen Thanh Phuong**, Paul J Van den Brink (2015). Ecological risk assessment of the antibiotic enrofloxacin applied to *Pangasius* catfish farms in the Mekong Delta, Vietnam. *Chemosphere*. Volume: 119; Pages: 407-414.
  - Pham Minh Duc, Tran Thi Tuyet Hoa, **Nguyen Thanh Phuong**, R.H. Bosma, Huynh Van Hien, Tran Ngoc Tuan (2015). Virus diseases risk-factors associated with shrimp farming practices in rice-shrimp and intensive culture systems in Mekong Delta Viet Nam. *International Journal of Scientific and Research Publications*. Volume 5, Issue 8.
  - Rasmus Ern, Do Thi Thanh Huong, **Nguyen Thanh Phuong**, Peter Teglbjerg Madsen, Tobias Wang, Mark Bayley (2015). Some like it hot: Thermal tolerance and oxygen supply capacity in two eurythermal crustaceans. *Scientific Reports* 06/2015; 5. DOI:10.1038/srep10743.
  - Tran Minh Phu, Caroline Douny, Marie-Louise Scippo, Edwin De Pauw, Nguyen Quoc Thinh, Do Thi Thanh Huong, Huynh Phuoc Vinh, **Nguyen Thanh Phuong**, Anders Dalsgaard (2015). Elimination of enrofloxacin in striped catfish (*Pangasianodon hypophthalmus*) following on-farm treatment. *Aquaculture* 438 (2015) 1–5
  - Tran Minh Phu, Marie-Louise Scippo, **Nguyen Thanh Phuong**, Cao Thi Kieu Tien, Co Hong Son, Anders Dalsgaard (2015). Withdrawal time for sulfamethoxazole and trimethoprim following treatment of striped catfish (*Pangasianodon hypophthalmus*) and hybrid red tilapia (*Oreochromis mossambicus* × *Oreochromis niloticus*). *Aquaculture*. Volume 437, Pages 256–262.
  - Tran Ngoc Hai, Pham Minh Duc, Vo Nam Son, Truong Hoang Minh, **Nguyen Thanh Phuong** (2015). Innovation of marine shrimp seed production and farming in Vietnam. *World Aquaculture* 03/2015;
  - Bui Thi Bich Hang, **Nguyen Phuong Thanh** & Patrick Kestemont (2014). Oral administration of *Escherichia coli* lipopolysaccharide



enhances the immune system of striped catfish, *Pangasianodon hypophthalmus* (Sauvage). *Aquaculture Research*. Pages: 1–10. doi:10.1111/are.12589.

- Bui Thi Bich Hang, **Nguyen Thanh Phuong** and Patrick Kestemont (2014). Can immunostimulants efficiently replace antibiotic in striped catfish (*Pangasianodon hypophthalmus*) against bacterial infection by *Edwardsiella ictaluri*?. *Fish & Shellfish Immunology* 40: 556-562.
- Dang Thi Hoang Oanh, Tran Viet Tien and **Nguyen Thanh Phuong** (2014). Effect of Insecticide Containing Deltamethrin on Immune Response of the Giant Freshwater Prawn, *Macrobrachium rosenbergii* (De Man 1879). *Asian Fisheries Science* 27: 90-103
- Lefevre, S., T. Wang, A. Jensen, N.V. Cong, D.T.T. Huong, **N.T. Phuong**, M. Bayley (2014). Air-breathing fishes in aquaculture. What can we learn from physiology?. *Journal of fish Biology*. Volume: 84, No. 3. Pages: 705-731.
- Rasmus Ern, Do Thi Thanh Huong, **Nguyen Thanh Phuong**, Tobias Wang, Mark Bayley (2014). Oxygen delivery does not limit thermal tolerance in a tropical eurythermal crustacean. *The Journal of Experimental Biology*. 217: 1-6. doi:10.1242/jeb.094169
- Bui Thi Bich Hang, Sylvain Milla, Virginie Gillardin, **Nguyen Thanh Phuong** and Patrick Kestemont (2013). In vivo effects of Escherichia coli lipopolysaccharide on regulation of immune response and protein expression in striped catfish (*Pangasianodon hypophthalmus*). *Fish & Shellfish Immunology* 34 (2013) 339-347.
- **Nguyen, P.T.** & Tran, T.C.L. (2013). Species profile: striped catfish (*Pangasionodon hypophthalmus* Sauvage, 1878). *In: Aquaculture Feed and Fertilizer Resources Information System* ([www.fao.org/fishery/affris/en/org/fishery/affris/en/](http://www.fao.org/fishery/affris/en/org/fishery/affris/en/)). Rome, FAO.
- Sjannie Lefevre, Tobias Wang, Do Thi Thanh Huong, **Nguyen Thanh Phuong** and Mark Bayley (2013). Partitioning of oxygen uptake and cost of surfacing during swimming in the air-breathing catfish *Pangasianodon hypophthalmus*. *J Comp Physiol B* (2013) 183:215–221.
- Tam M. Bui, **Nguyen Thanh Phuong**, Gia Hien Nguyen, Sena S. De Silva (2013). Fry and fingerling transportation in the striped catfish, *Pangasianodon hypophthalmus*, farming sector, Mekong Delta, Vietnam: A pivotal link in the production chain. *Aquaculture* 388–391 (2013) 70–75.

### Co-Teachers' profile

#### Vo Nam Son, PhD, Associate Professor

- Working institution: College of Aquaculture and Fisheries, Can Tho University (Vietnam)
- Contacts: [ynson@ctu.edu.vn](mailto:ynson@ctu.edu.vn)
- Qualification: MSc. and PhD in Aquaculture at Asian Institute of Technology, Thailand.
- Teaching fields: Crustacean farming, Applied statistic in Aquaculture
- Research fields: Marine species farming, Aquaculture socio-economics



- Recent publications:
  - Tran Minh Phu, Nguyen Thanh Phuong, Tu Thanh Dung, Dao Minh Hai, **Vo Nam Son**, Andreu Rico, Jesper Hedegaard Clausen, Henry Madsen, Francis Murray & Anders Dalsgaard. 2015. An evaluation of fish health-management practices and occupational health hazards associated with *Pangasius catfish (Pangasianodon hypophthalmus)* aquaculture in the Mekong Delta, Vietnam. *Aquaculture Research*, Online **ISSN: 1365-2109**.
  - **Vo Nam Son**, Nguyen Duong Anh, Phan Thanh Lam, Ly Van Khanh, Tran Ngoc Hai and Nguyen Thanh Phuong. 2015. Nutrient characteristics and benefit of sediment re-used of tra catfish pond for agriculture in the Mekong Delta. *Journal of Science, Can Tho University*, No 38b, 116-123.
  - Ly Van Khanh, **Vo Nam Son**, Pho Van Nghi and Tran Ngoc Hai. 2015. The current status of technique and finance in the seed production of white-leg shrimp in the Mekong Delta. *Journal of Science, Can Tho University*, No 39b, 108-117.
  - Tran Ngoc Hai, Pham Minh Duc, **Vo Nam Son**, Truong Hoang Minh and Nguyen Thanh Phuong. 2015. Innovation in Seed Production and Farming of Marine Shrimp in Vietnam. *World Aquaculture*.
  - Ly Van Khanh, **Vo Nam Son**, Chau Tai Tao and Tran Ngoc Hai. 2015. Effect of alkalinity on metamorphic and survival rate of mud crab larvae (*Scylla paramamosain*). *Journal of Science, Can Tho University*, No 38b, 61-65.
- **Languages:** Vietnamese and English

## TSQ904 MODELLING IN AQUATIC RESOURCES MANAGEMENT

### Course Description

The course will provide PhD students knowledge on principles of modelling using different tools and techniques to develop models or scenarios for aquatic resource management. Practical will be also provided to train the students practicing in development different models based on available data for monitoring and management of the resources.

### Learning Outcomes:

- Understand the principles in using modelling techniques;
- Develop scenarios and models for resource management
- Analyse and assess available data for modelling
- Apply modelling system in monitoring and management of the resources

### Competences

- Utilize proficiently modelling techniques
- Manipulate and compute data for running a modelling
- Interpret data and scenario in resource management

### Teaching methods:





- Lecture (theory)
- Computure Lab and take home exercises

#### **Assessment methods:**

- Lab exam (30%)
- Final exam (60%)

Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place. Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 then converted to A-B-C-D score based on the academic provisions of the University.

#### **Teachers' profile**

##### **Van Pham Dang Tri, PhD and Associate Professor**

- Working institution: College of Environment and Natural Resources, Can Tho University (Vietnam)
- Contacts: [vpdtri@ctu.edu.vn](mailto:vpdtri@ctu.edu.vn)
- Qualification: PhD. in Physical Geography at Southampton University, the UK
- Teaching fields: Water modelling, hydrological dynamics
- Research fields: Modelling, mapping, hydrology
- Recent publications:
  - Hanington, P., To Quang Toan, **Van Pham Dang Tri**, Vu Doan Ngoc Anh, A.S. Kiem (2017). A hydrological model for interprovincial water resource planning and management: a case study in the Long Xuyen Quadrangle, Mekong Delta, Vietnam. *Journal of Hydrology*, 547, 1-9, doi: <http://dx.doi.org/10.1016/j.jhydrol.2017.01.030>.
  - Roel, H.B., Ngo The An, Huynh Van Chuong, Le Thi Huong, Dang Kieu Nhan, **Van Pham Dang Tri**, H. van Gerardo (2016). Seven steps in identifying local climate change responses for agriculture in Vietnam. *Tropicultura*, 34\_NS, 31-49.
  - Dang KN., To LP., Nguyen NS., Vo VH., Nguyen HT., **Van Pham Dang Tri**, Nguyen HT., Bosma RH., van Halsema G. (2016). Climate Change Adaptation Strategies for Freshwater Agriculture in the Coastal Mekong Delta: Farm-scale Opportunities and Water Management Challenges, *Tropicultura*, 34\_NS, 120.
  - Hiroshi T., **V.P.D Tri**, T.V. Ty, N.D. Thao, L.T. Anh, G.V. Vinh (2016). Flow intensification induced by tidal oscillations in tributaries of the Mekong River *Int. J. of Safety and Security Eng*, 6 (3), 697–703.
  - Dang, D.T., Cochrane A.T., Arias E.A., **Van P.D.T.** and De-Vries T. (2016). Hydrological alterations from water infrastructure development in the Mekong floodplains. *Hydrological Processes*. doi: 10.1002/hyp.10894.
  - Hak, D., K. Nadaoka, L.P. Bernado, V.L. Phu, N. H. Quan and T.Q. Toan, N.H. Trung, D.V. Ni, and **V.P.D. Tri** (2016). Spatio-temporal variations of sea level around the Mekong Delta: their causes and



consequences on the coastal environment. *Hydrological Research Letters* 10(2), 60–66, doi: 10.3178/hrl.10.60.

- Chapman A.D., Stephen E., Hong M.H., Emma L.T., and **Van P.D.T.** (2016). Identifying an emergent risk: sediment service loss in the Vietnamese Mekong Delta. *Climatic Change*, 1 - 34. DOI 10.1007/s10584-016-1684-3.
- Hiroshi., T., Tsurudome C. , Nguyen D.T., Le T.A., Tran V.T., and **Van P.D.T.**, (2016). Ocean tidal modelling for urban flood risk assessment in the Mekong Delta. *Hydrological Research Letters*. Vol. 10, No. 1, 21-26. <http://doi.org/10.3178/hrl.10.21>.
- Joffre, O. M., Bosma, R. H., Ligtenberg, A., **Tri, V. P. D.**, Ha, T. T. P., and Bregt, A. K. (2015). Combining participatory approaches and an agent-based model for better planning shrimp aquaculture. *Agricultural Systems*, 141, 149–159. <http://doi.org/10.1016/j.agsy.2015.10.006>.
- Nowacki, D. J., A. S. Ogston, C. A. Nittrouer, A. T. Fricke, and **D. T. Van Pham** (2015), Sediment dynamics in the lower Mekong River: Transition from tidal river to estuary, *J. Geophys. Res. Oceans*, 120, doi:10.1002/2015JC010754.
- Smajgl A., To Toan, Dang Nhan, John Ward, Nguyen Trung, Le Tri, **Van Tri**, and Pham Vu (2015). Responding to rising sea-levels in Vietnam's Mekong Delta. *Nature Climate Change*; DOI: 10.1038/NCLIMATE2469.
- **Van Pham Dang Tri**, Nguyen Hieu Trung, Vo Quoc Thanh (2013). Vulnerability to flood in the Vietnamese Mekong Delta: Mapping and uncertainty assessment. *Journal of Environmental Science and Engineering*

**Languages:** Vietnamese and English

## **TSQ905 MARINE RESOURCES CONSERVATION AND DEVELOPMENT**

### **Course Description**

The aims of this course are to offer students the advanced knowledge on marine resources, their diversity and importance; status and trends in protecting and conserving the resources; and importantly how to develop the resources in terms of exploitation and development sustainably.

### **Learning Outcomes:**

- Understand deeply on the resources and principles of conservation;
- Understand firmly the mechanisms of resource exploitation and development;
- Analyse and assess the correlation between resource exploitation and development;
- Develop model, systems for sustainable exploitation and development of the resources in sustainable ways

### **Competences**

- Determine and decide proper solution
- Establish a system for exploitation and development of the resources



- Assess and propose better measures for resource management and development

**Teaching methods:**

- Class lectures
- Group discussion
- Presentation

**Assessment methods:**

- Attendance (5%)
- Work assignment (presentation/discussion) (15%)
- Lab work (30%)
- Final exam (Compulsory) (50%)

The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

**Teachers' profile**

**Tran Dac Dinh, PhD and Associate Professor** (see above)

**Languages**

Vietnamese

**TSQ906 AQUATIC ENVIRONMENT ASSESSMENT**

**Course Description**

This course will provide students the overview of aquatic environment with abiotic and biotic factors that can influence on biodiversity of an ecosystem. Holistic assessment will be also given to aware of the potential agents that can be coming from different sources, especially anthropogenic activities on the resources. Parameters of factors that influence direct and indirect to the resources bot positively and negatively will be also evaluated.

**Learning Outcomes:**

- Master firmly the aquatic environment;
- Understand ecological relationship between biotic and abiotic factors in an ecosystem;
- Master the impacts of water parameters on biodiversity;
- Analysis and assess the importance of environment on aquatic resources

**Competences**

- Manipulate proficiently tools for environment assessment
- Assess the status and potential of aquatic environment
- Propose solution to manage the environment



**Teaching methods:**

- Class lectures
- Group discussion
- Presentation

**Assessment methods:**

- Attendance (5%)
- Midterm exam (25%)
- Final exam (70%)

The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

**Teachers' profile:****Huynh Truong Giang, PhD**

- Working institution: College of Aquaculture and Fisheries, Can Tho University (Vietnam)
- Contacts: [htgiang@ctu.edu.vn](mailto:htgiang@ctu.edu.vn)
- Qualification: PhD in Aquaculture at National Pingtung University of Science Aquaculture and Technology Taiwan
- Teaching fields: water quality management, Analytical methods
- Research fields: water quality, probiotics, prebiotics
- Recent publications:
  - Shiu Y.L., Chi C.C., **Huynh T.G.**, Liu C.H., Yeh S.P., 2017. Potential use of plasma water technology for controlling disease and water quality management in aquaculture. 10<sup>th</sup> Symposium on Disease in Asian Aquaculture (DAA10), Bali, Indonesia, 28 August- 1 September, 2017.
  - Ut, V.N., **Huynh, T.G.**, Phu, T.Q., Morales, J. and Phuong, N.T. (2016). Assessment of water quality in catfish (*Pangasianodon hypophthalmus*) production systems in the Mekong Delta. Can Tho University Journal of Science. 3: 71-78.
  - Nguyen Thi Kim Lien, **Huynh Truong Giang** and Vu Ngoc Ut (2014). Zoobenthos composition in Hau River. Journal of Science, Can Tho University, 2: 239-247. *In Vietnamese*.
  - Nguyen Thi Kim Lien, **Huynh Truong Giang** and Vu Ngoc Ut (2013). Zooplankton biodiversity in the Cu Lao Dung mangrove, Soc Trang province. Journal of Science, Can Tho University, vol. 25: 149-157. *In Vietnamese*.
  - Duong Thi Hoang Oanh, **Huynh Truong Giang** and Nguyen Thi Kim Lien, 2014. Fluctuation of phytoplankton community in intensive white leg shrimp (*Litopenaeus vannamei*) ponds referring to shrimp health status. Scientific Journal of Can Tho University. 2:159-168.



- Vu Ngoc Ut, Duong Thi Hoang Oanh and **Huynh Truong Giang**, 2013. Species composition and abundance of algae in the salt and Artemia production areas of the coast of Vinh Chau, Soc Trang. Collection of Marine Research Works. Vietnam Institute of Oceanography. 19:202-214.
- Nguyen Thi Kim Lien, **Huynh Truong Giang**, Vu Ngoc Ut, 2013. Zooplankton communities biodiversity in the Cu Lao Dung mangrove, Soc Trang province. Scientific Journal of Can Tho University. 25:149-157.
- Duong Thi Hoang Oanh, Nguyen Thi Kim Lien, **Huynh Truong Giang**, 2013. Effect of temperature, density and type of algae on the filtration rate of blood-cockle (*Anadara granosa*) Linne,1758. Scientific Journal of Can Tho University. 25:158-167.

**Languages:** Vietnamese and English

## **TSQ907 FISH POULATION DYNAMICS**

### **Course Description**

The objectives of this course are to provide PhD students broaden and advanced knowledge on fish population dynamics including temporal (seasons and year to year) and spatial dynamics (tropical versus temperate regions and different ecosystems) on population numbers, age structure, biomass; and solutions or measures to protect and manage the population.

### **Learning Outcomes:**

- Understand fish population dynamics;
- Master firmly all processes linked to population;
- Apply knowledge of population dynamics to manage fish stocks;

### **Competences**

- Analysis and assess status of a fish population for sustainable management
- Propose solution to manage fish populations

### **Teaching methods:**

- Class lectures
- Presentation

### **Assessment methods:**

- Attendance (5%)
- Work assignment (presentation/discussion) (25%)
- Final exam (70%)



The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

### **Teachers' profile**

**Tran Dac Dinh, PhD and Associate Professor** (see above)

**Tran Xuan Loi, PhD candidate**

- Working institution: College of Aquaculture and Fisheries, Can Tho University (Vietnam)
- Contacts: [txloi@ctu.edu.vn](mailto:txloi@ctu.edu.vn);
- Qualification: MSc in Marine conservation from University of Tasmania, Australia; PhD candidate in Bioresources restoration sciences, Nagasaki University, Japan.
- Teaching fields: Fisheries stock assessment, Fisheries resources management
- Research fields: Fisheries resources, Fish biodiversity, Fisheries stock assessment,
- Recent publications:
  - Tran Xuan Loi and Andrew Fischer 2017. Spatiotemporal changes and fragmentation of mangroves and its effects on fish diversity in Ca Mau Province (Vietnam). *Journal of Coastal Conservation*, DOI 10.1007/s11852-017-0513-9.
  - Tran Xuan Loi and Dinh Dac Tran, 2015. Impacts of shrimp farming on spatiotemporal changes and fragmentation of mangroves in thanh phu district, Ben Tre Province, Vietnam. *The International Fisheries Symposium 2015 (IFS 2015)*, 2015 Penang, Malaysia.
  - Tran Dac Dinh, Tran Xuan Loi, To Thi My Hoang, Nguyen Thi Vang, Kenzo Utsugi, Tomoko Oizumi, 2015. Roles of estuarine ecosystem in nursing ground: case study in cu lao dung, soc trang province, Vietnam. *The International Fisheries Symposium 2015 (IFS 2015)*, 2015 Penang, Malaysia.
  - Ngwenya Elkana, Phuc Le, and Tran Xuan Loi, 2013. A global study of gender differences in individual perspectives on loss of plant or animal biodiversity: Results from the world value surveys. *Eleventh International Conference on New Directions in the Himanities*, June 2013 Faculty of the Himanities, EÖtvös Loránd University, Budapest, Hungary.
  - Tran Dac Dinh, Koichi Shibukawa, Nguyen Thanh Phuong, Ha Phuoc Hung, Tran Xuan Loi, Mai Van Hieu, Utsugi Kenzo, 2013. *Fishes of The Mekong Delta, Vietnam*. Can Tho University Publishing House, Can Tho, 174 pages.

**Languages:** Vietnamese and English



## **TSQ908 BIO-INDICATORS AND APPLICATION**

### **Course Description**

This course will provide the learners knowledge of bio-indication and bio- indicators, bio-monitoring methodologies, rapid assessment of water quality based on aquatic organisms including algae, macro-invertebrates, fish..; bio-indices used in assessing the water quality and their advantages and disadvantages; application of bio-monitoring in monitoring and managing the water quality as well as biodiversity.

### **Learning Outcomes:**

- Master firmly the principles and mechanisms of bio-monitoring;
- Master firmly all biological and ecological characteristics of aquatic organisms used as bio-indicators;
- Master methodologies and use of different bio-indices as tools to assess the water quality for monitoring;

### **Competences**

- Know how to collect/sample aquatic groups for bio-monitoring
- Identify common aquatic organisms used in bio-monitoring
- Apply proficiently bio-indices in water quality and biodiversity assessment
- Apply proficiently bio-monitoring methodologies for water quality and biodiversity assessment

### **Teaching methods:**

- Class lectures
- Presentation

### **Assessment methods:**

- Attendance (5%)
- Work assignment (presentation/discussion) (25%)
- Final exam (70%)

### **Teachers' profile**

**Vu Goc Ut, PhD and Associate Professor** (see above)

**Languages:** Vietnamese and English

### **B: Research work**

#### **1). PhD Advisory Committee (PAC)**

- Advisory committee member*



The aim of the "PhD Advisory Committee" (denoted as PAC thereafter) is to monitor the progress of PhD students to help ensure successful completion of their theses. In addition, the PAC is also there to mediate in case of conflicts and/or communication difficulties between the student and advisor. PAC meetings are not an examination of the student.

*b) Advisory committee meeting*

PAC meetings focus on sufficient support from PhD student's advisor, progress of research schedule, equipment necessary supporting research activities, joining international conferences etc. Additionally, meetings will take place around the end of the second and third year. The last meeting will focus on the structure and timing of the final months of the thesis.

## **2). Research proposal**

A research proposal is a required document as part of an application for admission to a research degree at the University. It is necessary to prepare concisely/clearly the research proposal of the proposed research project. The proposal should be prepared by student and reviewed by advisor(s) before submission. In addition, the financial issues related to the research must be mentioned (which project? other sources...). If the proposal is admitted, this initial research proposal will be used as a basis for preparation of student final research program in your first year of candidature.

## **3). Publication**

According to the regulations for the doctoral program of Can Tho University, the student must meet the requirements of publications as follow:

- At least 02 main-author papers based on the obtained results from the thesis, of which at least 01 main-author-ISI papers or Scopus journal, or
- At least 02 main-author papers published on peer reviewed international conference proceedings, or
- At least 02 main-author papers published on peer reviewed international journals

## **4). Conference**

- Participating at at least 01 national conference and 01 international conference (Poster or oral presentation)

## **5). Workshop**

- Participating at at least 01 national/international conferences

## **6). Thesis writing**

- a) Thesis format & guideline
- b) -Thesis evaluation
- c) -Thesis defense
- d) -Thesis correction

## **Expected skills and competences**

- Abilities in thinking and organizing, rethinking and reorganizing
- Good English skills, especially reading and writin





- Good statistic understanding/performance for data analysis
- Ability to write the comprehensive the research proposal
- Good study habits and self-learning ability

### C: Research Area

*Describe the research focused area of the PhD program and potential research topics for PhD students*

**Research focused areas:**

- Genetic conservation
- Freshwater/marine ecology
- Marine biology and Conservation
- Climate change

**Potential research topics for PhD students should be:**

- Freshwater biodiversity conservation
- Marine biodiversity conservation
- Biomonitoring as a tool for water quality management
- Bioindicators in ecosystem along Mekong river
- Impact of climate change on the aquatic resources
- Fish population dynamics in estuaries in Mekong delta.
- Effects of manmade factors (e.g. fishing, invasive species, climate change)
- Conservation genetics of native species
- Species at risk, their habitats and sampling methods

