Certificate of Advanced Studies

Digital Forensics & Cyber Investigation Specialist 1

The digital transformation of society is affecting crime, criminals and criminal investigation. The Digital Forensics & Cyber Investigation (DFCI) continuing education program at BFH was created to address new education demand for skilled digital forensic and cyber investigators.

The CAS DFCI Specialist 1 and provides you with advanced knowledge and skills in specialized domains. The topics covered include Network Forensics, Malware Forensics, Data Analytics, and Cloud/VM forensics.

Berner
Fachhochschule

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1 Environment

The digital transformation of society is affecting crime, criminals and criminal investigation. New cyber criminal methods using advanced technical tools and exploitation are an opportunity for criminals and a challenge for investigators. Technically complex illegal activities are being sold as services to less skilled criminals, increasing the challenge of fighting cybercrime. On the other hand, criminals face challenges trying to hide and avoid attribution. The large amount of digital traces stored across multiple locations creates an opportunity for criminal investigators.

Crime scenes are also changing. With the growth of cybercrime, crime scenes are becoming virtual, global, and multi-jurisdictional. Investigating a trans-national cyber crime scene requires investigative tools to remotely gather information, and also collaboration between entities in both the public and private sectors.

Modern physical crime scenes have a comprehensive set of digital evidence sources. In addition to PCs and notebooks, digital evidence traces can be found in mobiles, IoT devices, automobiles, smart control systems, data stored with cloud providers, and distributed on servers across the Internet. With the increase in digital and online payment systems, financial transactions are also becoming an important digital evidence source, especially in financially motivated crimes like fraud.

2 Target audience

The DFCI program is designed for two groups of professionals:

- Experienced forensic investigators who want to increase their technical skills in digital forensics and cyber investigations

- Experienced engineers and technicians who want to transition into the field of digital forensics and cyber investigations.

3 Career opportunities

This will prepare students for career opportunities in a variety of organizations:

- Law enforcement – Federal agencies, KAPOs
- Military and government – CERTs, cyber-troops
- Finance industry – fraud/cybercrime investigation teams
- Insurance industry – cyber insurance claims investigation
- Large enterprises – security and incident response teams
- Consultancy and audit – e-Discovery, accounting, "Big Four"
- IT security service providers and product vendors
- Private boutique digital forensic and investigation firms

4 Requirements, education goals

Admission into the DFCI Master of Advanced Studies (MAS) or Certificate of Advanced Studies (CAS) requires one of the following:

- a university degree or equivalent professional education degree in computer science, computer engineering, or related field,

- professional experience in digital forensics or IT investigation, and a related industry certification.

If applicant qualifications are unclear or inconclusive, further information (for example, a CV) or an interview may be requested

This continuing education program has practical learning objectives. Students completing the CAS Specialist I will understand concepts and have skills in specialist areas including network forensics, malware analysis, data analytics and visualization and e-discovery.

5 Language, Location, Contact

Modules are conducted in one-week fulltime periods and taught in English. Some modules may have pre-reading recommendations. Module assignments and exams are completed by the end of the week.

The location of taught classes is the Switzerland Innovation Park, Aarbergstrasse 46, in Biel/Bienne. More information can be found here: https://www.bfh.ch/en/about-bfh/locations-facilities/locations/biel-aarbergstrasse-46/.

Some modules allow remote attendance, however, onsite attendance is strongly recommended (better teaching experience, building friendships with your student colleagues and teachers).

Please see the schedule for the latest dates and onsite availability.

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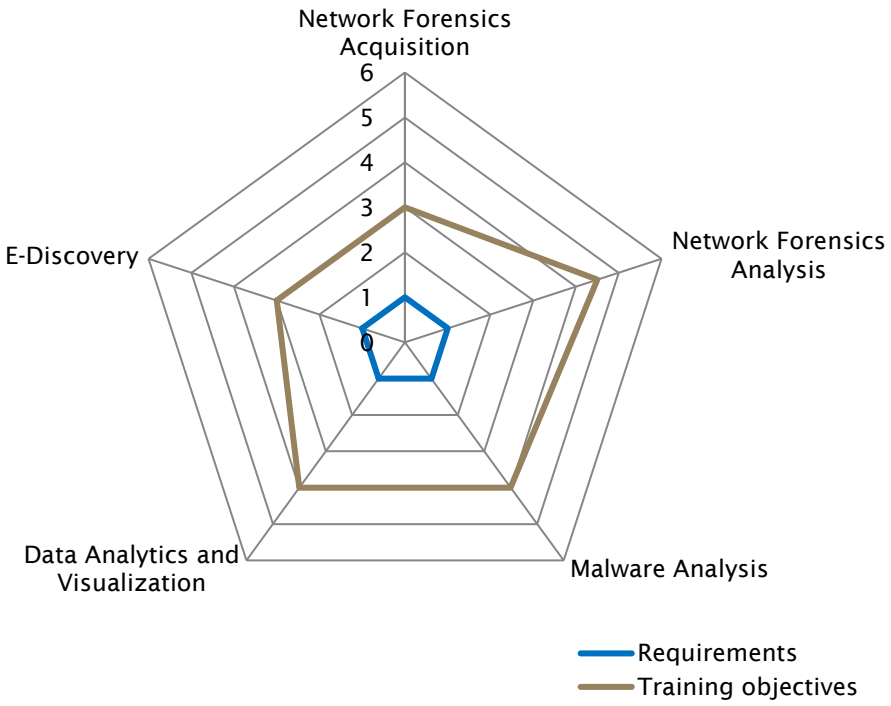
6 Skills profile



Skill levels

1. Proficiency/knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Appraisal

7 Course outline

Course / Teaching unit	Lessons	Lecturers
Network Forensics	40	Reto Inversini
Malware Analysis	40	Endre Bangerter
Data Analytics and Visualization	40	Hans Hensler
E-Discovery	40	Irène Wilson
Total	**160**	

The CAS comprises a total of 12 ECTS credits. For the individual courses, time for self-study, exam preparation, etc. must be taken into account as needed.

Please see the schedule for the latest dates and onsite/hybrid availability.

8 Course descriptions

The individual modules that make up this programme are described below.

A module may include a variety of teaching methods such as lectures, seminars, case studies, practical labs, assignments, etc.

8.1 Network Forensics

Educational objectives	This module teaches advanced network forensics, packet capture and analysis.
Topics and content	- Network infrastructure traffic interception - Wired and wireless traffic interception - Introduction to mobile data networks (LTE, xG) - Packet capture file formats and containers - Traffic and packet analysis - Decoding and assembling protocol layers - Extraction of application data - Introduction to network encryption
Course materials	Provided in Moodle

8.2 Malware Forensics

Educational objectives	This module teaches the forensic analysis of Malware and malicious code.
Topics and content	- Static and dynamic binary analysis techniques - Debuggers, disassembly, sandboxes, basic reverse engineering - Malware identification and family categorization - DLL hooking and injection - Man-in-the-browser, web injection - Malware persistence, hiding and obfuscation - Botnet architectures, bot configuration files - Botnet sink-holes and disruption
Course materials	Provided in Moodle

8.3 Data Analytics and Visualization

Educational objectives	Working with big data in a forensic investigation context.
Topics and content	- Log analysis and corelation - Event reconstruction using timelines - Using Plaso to create super-timelines - Working with Big Data repositories - Correlation and relationship analysis - Statistical analysis - Advanced search techniques
Course materials	Provided in Moodle

8.4 E-Discovery

Educational objectives	This module covers the Electronic Discovery processes in corporate legal and litigation investigations.
Topics and content	– Introduction to civil investigations and litigation – Concepts of E-Discovery, client privilege – Electronic Discovery Reference Model (EDRM) – Corporate document retention and legal IT – Electronically stored information (ESI) – Document/record identification and preservation – Data pre-processing and processing – Review, production, and presentation
Course materials	Provided in Moodle

9 Proof of proficiency

To gain the 12 ECTS credits, students must demonstrate proficiency by successfully completing all coursework (examinations, project work), in accordance with the following list:

Proof of proficiency	Weighting	Type of qualification	Student pass rate
Network Forensics	2.5	Final exam	0 – 100 %
Malware Forensics	2.5	Final exam	0 – 100 %
Data Analytics and Visualization	2.5	Final exam	0 – 100 %
E-Discovery	2.5	Final exam	0 – 100 %
Total weighting / Pass rate	10		3 - 6

The weighted average of the success rates of the individual proofs of proficiency is converted into a grade between 3 and 6. A grade of 3 (average success rate of less than 50%) is unsatisfactory. Grades 4, 4.5, 5, 5.5 and 6 (average success rate between 50% and 100%) are sufficient.

10 Lecturers

First name / Last name	Course	Company	E-mail
Reto Inversini	Network Forensics	MELANI	reto.inversini@bfh.ch
Endre Bangerter	Malware Forensics	ThreatRay	endre.bangerter@bfh.ch
Hans Hensler	Data Analytics and Visualization	DFRWS	j.henseler@dfrws.org
Irène Wilson	E-Discovery		irene.wilson@bfh.ch

11 Organisation

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Changes may be made to content, learning objectives, lecturers and required proficiency levels. The lecturers and the Head of Studies are authorised to make adjustments to a CAS on the basis of current developments in a subject area, the specific previous knowledge and interests of the students, or for didactic and organisational reasons.

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