

GHEP-ISFG Forensic Advanced Theoretical Challenge 2026

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Instructions

Thank you for participating in the 2026 GHEP-ISFG Forensic Advanced Theoretical Challenge (ATC)! Alike the 2024 and 2025 edition, this ATC focuses on the interpretation of (complex) DNA mixture profiles and includes interpreting mock case mixture profiles as well as theoretical multiple choice questions. A difference in comparisons to previous years is that this ATC Forensic focuses on one topic, namely '*Multiple Persons of Interest*', and that e-learning material is provided for those who would like to learn more on this topic during this ATC.

Before starting with the exercises, please answer the questions using the questionnaire entitled '*General questions on casework practice*' to provide some general information on your current casework practice. We are aware that the provided DNA profiles (STR typing kit, settings for analysis, no DNA concentration provided, no Y-STR results, etc.) may differ from your casework practice. Therefore, we would like to gain insight in how much these exercises vary from your day to day work, so that this can be taken into account when analyzing the results.

In this ATC, two mock cases are provided, as well as a few additional multiple choice questions on your expectations. Both mock cases include a trace profile and three reference profiles of persons of interest. For these cases, we ask you to interpret the DNA profile, including performing likelihood ratio (LR) calculations, answering questions with regards to the interpretation of the specific case, and completing an Excel spreadsheet for combined weight of evidence. Subsequently, the additional multiple choice questions can be answered.

Below, you will find details on the DNA profiles and information for performing LR calculations. Please read this carefully. After this, you can start with the exercises and fill out the corresponding questionnaires as well as an Excel spreadsheet for combined weight of evidence.

We are looking forward to receiving your answers and interpretations. If there is anything unclear, or in case you have additional questions, please send these to info@ghep-isfg.org.

Details on the DNA profiles

The DNA profiles for case 1 in this ATC were generated using the PowerPlex Fusion 6C kit (with 29 cycles PCR and 1.2kV 24sec CE injection settings on an ABI 3500xL apparatus).

The DNA profiles for case 2 in this ATC were generated using the GlobalFiler kit (with 29 PCR cycles and 15sec CE injection settings on an ABI 3500 Genetic Analyser).

Details on DNA profile analysis and information for LR calculations are provided in Tables 1-4.

Table 1. DNA profile analysis settings used in the GHEP-ISFG 2026 ATC for PowerPlex Fusion 6C data in case 1.

Filter	Loci	Threshold Case 1 (PowerPlex Fusion 6C)
Analytical thresholds	AMEL, D3S1358, D1S1656, D2S441, D10S1248, D13S317, Penta E	95 RFU
	D16S539, D18S51, D2S1338, CSF1PO, Penta D	140 RFU
	TH01, vWA, D21S11, D7S820, D5S818, TPOX	85 RFU
	D8S1179, D12S391, D19S433, SE33, D22S1045	135 RFU
	FGA and DYS markers	95 RFU
Stutter filters applied	Yes	See Table 2
Minimum heterozygote imbalance (MHI) percentage ^a	All loci	3%
Stochastic threshold (ST) ^b	All loci	800 RFU

^a During profile analysis a MHI was applied, meaning that per marker, every peak that falls within 3% of the largest peak is removed by the software. This MHI is also denoted 'fractional threshold'.

^bThe ST is the threshold below which stochastic effects are likely to have occurred (such as drop-out, drop-in, heterozygote imbalance). For this kit and settings, the ST was set at 98.9%, which means that in 1.1% of the cases, a single peak with a height >800 RFUs (seemingly homozygote) may in fact be a heterozygote with a dropped out allele. The ST is not used in statistical analyses but can provide experts insight into whether stochastic artefacts are to be expected.

Table 2. Stutter filters applied during DNA profile analysis of PowerPlex Fusion 6C profiles, in case 1. Note that although stutter filters are applied, these may not have been removed for 100% of the stutter peaks, specifically at the +/- 1 position.

	-1 Stutter ratio (%)	-0.5 Stutter ratio (%)	+1 Stutter ratio (%)	+0.5 Stutter ratio (%)
Amel	-	-	-	-
D3S1358	13.5	-	2.7	-
D1S1656	14.3	3.6	2.8	-
D2S441	9.0	-	2.1	-
D10S1248	13.0	-	2.9	-
D13S317	10.3	-	3.2	-
PENTA E	7.5	-	1.9	-
D16S539	12.0	-	3.0	-
D18S51	14.6	-	3.0	-
D2S1338	13.6	-	2.2	-
CSF1PO	11.1	-	3.9	-
PENTA D	4.5	-	3.7	-
TH01	4.8	-	1.5	-
vWA	14.4	-	2.7	-
D21S11	12.7	-	2.9	-
D7S820	9.7	-	2.2	-
D5S818	11.0	-	3.3	-
TPOX	5.4	-	1.1	-
D8S1179	11.8	-	3.4	-
D12S391	17.4	-	2.7	-
D19S433	12.1	-	2.6	-
SE-33	17.6	7.4	3.6	2.5
D22S1045	16.8	-	11.2	-
DYS391	14.1	-	2.1	-
FGA	12.4	-	2.8	-
DYS576	18.75	-	3.4	-
DYS570	19.5	-	2.4	-

Table 3. DNA profile analysis settings used in the GHEP-ISFG 2026 ATC for GlobalFiler data in case 2.

Filter	Loci	Threshold Case 2 (GlobalFiler)
Analytical thresholds	D3S1358, vWA, D16S539, CSF1PO, TPOX	60
	Yindel, AMEL, D8S1179, D21S11, D18S51, DYS391	80
	D2S441, D19S433, TH01, FGA	45
	D22S1045, D5S818, D13S317, D7S820, SE33	75
	D10S1248, D1S1656, D12S391, D2S1338	100
Stutter filters applied	No	

Information for performing weight of evidence calculations

In this ATC, participants are free to use any system for weight of evidence calculations. For comparison of the results, we do ask you to use the parameters as provided in this document as much as possible, and where applicable to the LR system of use. If your system has any additional, or other, parameter settings that are not mentioned in Table 4, please provide this information in questionnaire '*General questions on casework practice*'.

Table 4. Settings for LR calculations.

Setting (if applicable to the LR system of use)	PowerPlex Fusion 6C (case 1)	GlobalFiler (case 2)
Allele frequencies file	Fusion_6C_Holland2	NIST 1036-Caucasian
Rare allele frequency	0.0003	0.006925208
Fst/ theta/ coancestry coefficient	0.03	0.01
Drop-in probability	0.05	0.00073 (if LRmix Studio is used, use 0.001 as the value for drop-in)
Drop-in peak height (lambda)	0.01	0.03846
Kit	PowerPlex Fusion 6C	GlobalFiler
Analytical thresholds	See Table 1	See Table 3