# PayTech Academy

# ISO 8583 & Transaction Processing:

# From terminal to issuer

*Turning new hires into contributing transaction processing specialists*



| Standard practices | Certification | Compliance | Transaction authorization | End-to-end |
| Message switching | Requests | Advice | Reversals | Network management | DUKPT |
| Magstripe | EMV | Contactless | Dynamic Key Exchange | Online PIN |

# e-learning course description

## Summary

This online course is designed to bring students to a level of proficiency with ISO 8583 and transaction processing in just a few of days. No prior payment knowledge is required, just basic IT skills.

It is taught by a highly experienced instructor, and learning outcomes are reached with taught lessons, quizzes and 22 practical exercises for the guided parsing and analysis of many messages. This course teaches more than just what the norms expect, it is based on the instructor's vast experience of how the various elements were actually implemented by many acquirers and issuers in different countries.

It is intended for anyone who needs strong technical knowledge on ISO 8583 or transaction processing to be effective and efficient in their work. Perfect to get new hires up to speed and ready to contribute, but also great for professionals who are looking to expand their skillset.

The course may be purchased as one single course, or as a <u>series of 4 modules</u>.

## Context

Transaction processing can be difficult to approach. There is not much information freely available, and you need much more than access to a specification or a norm to get started. The worst kept industry secret is that there is no such thing as "the" ISO 8583 protocol. To start with, there are several versions of that norm. But more importantly there are only protocols which are based on ISO 8583, and which use the norm to support business requirements, with implementation choices.

This course was designed to help learners who have some basic IT knowledge enter that space and make sense of all this information. It used to take months to become proficient with ISO 8583 or transaction processing, now it can be done in just a few days.

## Key benefits for organizations

Being able to bridge the knowledge gap between IT skills and in-depth knowledge of transaction processing with ISO 8583 brings the following benefits to organizations:

- it improves the expertise and productivity of their employees or outsourced partners;
- it helps reducing staff turnover, because employees with the skills to do their job are happier;
- it reduces the impact of job rotation on a team's performance;
- it facilitates hiring by reducing the need to look for highly experienced professionals;
- it allows in-house experts to focus on delivering value to clients or customers;
- it helps organizations to meet the compliance and certification deadlines.

## Course outcome

The course bridges the knowledge gap between IT and ISO 8583 and transaction processing. Students who complete the course will:

- ❖ Understand the big picture, who all the players are and what information they expect
- ❖ Get a good understanding of the different data elements in the ISO 8583 norms
- ❖ Be able to parse a raw ISO 8583 message
- ❖ Understand how messages are converted from one system to another
- ❖ Know how to follow a transaction from the POS terminal or ATM to the card issuer
- ❖ Get familiar with industry standard practices for transactions processing
- ❖ Know what is expected for compliance and certification

In addition to gaining in-depth knowledge of the mechanics of ISO 8583, student will leave with:

- A completion certificate
- A downloaded and printable version of the course material

## Intended audience

This course is a must-have for everyone who needs strong, technical, payment transaction processing knowledge to be effective and efficient in their work.

This includes developers, QA, customer support and managers in the following areas:

- Acquirer host
- Payment processor switch
- Issuer host
- Payment terminal integration
- Troubleshooting transaction failures for banks or acquirers
- Chip card issuance
- Consulting in any of the areas above

However, there are many other areas where this knowledge can prove invaluable.

## Accessibility

All the video lessons come with English closed captions/subtitles, which have been automatically translated into the following languages: Arabic, Chinese (Simplified), Dutch, Finnish, French, German, Greek, Hindi, Italian, Japanese, Korean, Persian, Polish, Portuguese, Russian, Spanish, Swedish, Tagalog, Tamil, Turkish, Ukrainian and Urdu.

## Duration

The course contains 10 hours of video material, delivered in bite sizes and split into chapters. The full break-down is provided at the end of this document. With the addition of the chapter quizzes and the 22 practical exercises for the guided parsing and analysis of many messages, the course is usually completed in 22 to 27 hours. This is equivalent to 3-4 days of classroom training.

## Instructor

Taught by Hervé Zenner (MSc, MBA), card payment expert.

I have a passion for helping people reach their full potential. As a strong believer of the concept of sustainable leadership, I can feel the pain of employees who cannot perform at their best because of the difficulty of knowledge transfer.
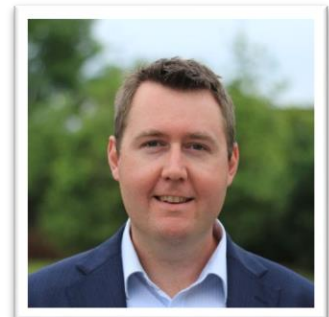
I have 10 years of strong, technical experience in the card payment industry, working in Gemalto, Oberthur, UL and an EMV security lab. In my previous role in product marketing for a very complex payment simulator, I was faced with bridging this knowledge gap on a regular basis. My most prized accomplishment in my career is the development of a formalized payment education program for South Africa.

## Unique learning approach

The learning path is one of increasing complexity, with building blocks to construct the ISO 8583 knowledge, and practical exercises and quizzes to keep students engaged. The course contains 22 practical exercises for the guided parsing and analysis of many messages.
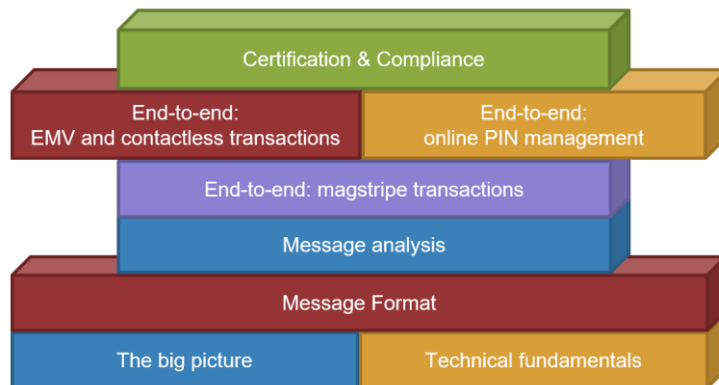


The course starts with the big picture: the non-technical, high-level information. It is followed by some technical fundamentals; this is to ensure that students have a solid IT base for ISO 8583, and is supplemented with practical exercises. Based on those two blocks, students start their journey into the technical aspects of ISO 8583 with an overview of how messages are structured, followed by courses on Message Type Identifiers, bitmaps and length and format indicators. Those courses are supplemented with practical exercises so that students can apply those concepts.

The journey continues with an in-depth review of all the ISO 8583 data elements, looking at the 1987 and 1993 norms and at how they are used in practice in the industry. This is also supplemented with practical exercises, to help students grasp how those data elements are structured. The capstone of this review is a course on message parsing, where students learn how to extract information from a raw ISO 8583 message, and perform parsing themselves. And the in-depth journey on ISO 8583 finishes with explanations on transaction flows and data element presence in messages.

The course then zooms out of the low-level structure of ISO 8583, and teaches students how to perform analyses of individual messages, starting with network management messages, really focusing on authorization request messages, and also looking at authorization advice, financial messages, and reversals. Practical exercises with many different transaction samples are provided to help the student construct real experience on message analysis.

The course then zooms out once more, and looks at the transactions from end to end. It follows ISO 8583 messages as they are generated by a payment terminal all the way to their authorization by a card issuer, going through the different message conversion processes, where the student can see the data elements that are converted, removed and added as the message is processed by each actor of the payment chain and potentially changes version of ISO 8583. The course looks at magstripe, contactless magstripe, contact EMV and contactless EMV transactions. And the final, technical course is on online PIN, where the student can see the hidden complexity that surrounds online PIN, follow a full end-to-end online PIN transaction with the different HSM calls, and learn how dynamic key exchange is handled by the different systems.

The course concludes on the difference between brand compliance and certification, how they work and what is expected by the brands.

## Discovering the course

The course is available at his address:

https://courses.paytech-academy.com/courses/iso-8583-transaction-processing

Students can sign up for a free trial of the course, which gives access to 3 lessons.

## Enrolling in the course

Students can enrol directly on the course landing page. The platform accepts payment with PayPal and Stripe, effectively allowing the use of all major credit and debit cards.

Corporate clients can also buy tokens that can be distributed to associates or employees, or send us a list of users that we will set up on our platform. This can be done from the inquiry form on: https://www.paytech-academy.com/corporate-clients or by e-mail at team@paytech-academy.com.

## How is this course different?

There are very few other courses on ISO 8583 and transaction processing, but this course is differentiated from them in the following ways:

- Scope: it is the only technical course that takes a student from basic IT knowledge to a level of proficiency with ISO 8583 and transaction processing.
- Delivery: compared to classroom training, e-learning has been proved to be more effective with long-term retention of information, to provide faster training delivery and to greatly reduce costs. It also allows students to learn at their own pace and to not have to block entire days for training.
- Course instructor: there are few professionals with this level of technical expertise on the subject and with experience in knowledge transfer. The e-learning format provides instant access to the instructors' experience without having to pay for flights, hotels and expenses.
- Learning approach: well-crafted exercises and actual transaction analyses allow to assimilate knowledge much better than only taught lessons.

Payment technology companies with training programs see education as a side activity, as a foot in the door to upsell expensive software or services. The results are mixed at best: in-person training is expensive, it requires a lot of organization, the programs are usually very high-level and do not even scratch the surface of what you want to learn, and that's if you can even access those training courses.

PayTech Academy was created to give everyone a chance to one day become an expert in the payment technology industry. We understand that access to experts is difficult, even when you work in the same company, because those skills are rare and make those people extremely busy. Our aim is to provide the world with hands-on courses that take our students from where they are to a level of deep technical understanding in very specific areas. Our approach is to build knowledge block by block, while keeping students engaged and allowing them to form the mental links required to become an expert. For this, we augment our education with well-crafted practical exercises and quizzes.

## Course Curriculum

| Chapter 1 | The big picture |
| --- | --- |
| Duration | 0:40:38 |
| Content | Course material (download) |
| | The actors |
| | Transaction stages |
| | Complexity of chip-based transactions |
| | Cryptography |
| | Specifications |
| | Message switching and routing |
| | Chapter 1 Quiz |

| Chapter 2 | Technical fundamentals |
| --- | --- |
| Duration | 0:37:59 |
| Content | Binary |
| | Bytes (with Practical exercises) |
| | Hexadecimal (with Practical exercises) |
| | Bitmaps (with Practical exercises) |
| | BCD (Binary-Coded Decimal) |
| | ASCII and EBCDIC (with Practical exercises) |
| | Chapter 2 Quiz |

| Chapter 3 | Message format |
| --- | --- |
| Duration | 3:51:51 |
| Content | Message format overview |
| | Message type identifiers (with Practical exercises) |
| | Bitmaps (with Practical exercises) |
| | Length and format indicators (with Practical exercises) |
| | Mid-Chapter 3 Quiz |
| | Data elements 1 to 16 (with Practical exercises) |
| | Data elements 17 to 32 (with Practical exercises) |
| | Data elements 33 to 48 (with Practical exercises) |
| | Data elements 49 to 64 (with Practical exercises) |
| | Data elements 65 to 80 (with Practical exercises) |
| | Data elements 81 to 96 (with Practical exercises) |
| | Data elements 97 to 112 (with Practical exercises) |
| | Data elements 113 to 128 |
| | Example of message parsing (with Practical exercises) |
| | Transaction flows |
| | Data Elements Presence |
| | Chapter 3 Quiz |

| Chapter 4 | Message analysis |
|---|---|
| **Duration** | 1:28:28 |
| **Content** | Authorization request messages - Part 1 (with Practical exercises) |
| | Authorization request messages - Part 2 (with Practical exercises) |
| | Authorization request messages - Part 3 (with Practical exercises) |
| | Authorization advice messages |
| | Financial request messages (with Practical exercises) |
| | Financial advice messages (with Practical exercises) |
| | Reversal messages (with Practical exercises) |
| | Chapter 4 Quiz |

| Chapter 5 | **End to End Magstripe transactions** |
|---|---|
| **Duration** | 0:36:51 |
| **Content** | Domestic magstripe transaction |
| | Cross-border contactless magstripe transaction |
| | Chapter 5 Quiz |

| Chapter 6 | **End to End EMV transactions** |
|---|---|
| **Duration** | 0:51:52 |
| **Content** | Contact EMV transaction |
| | Contactless EMV transaction |
| | Other types of ICC Data representation |
| | Chapter 6 Quiz |

| Chapter 7 | **End to End Online PIN transactions** |
|---|---|
| **Duration** | 1:02:23 |
| **Content** | Online PIN - General concept |
| | Online PIN transaction |
| | Dynamic Key Exchange Messages |
| | Chapter 7 Quiz |

| Chapter 8 | **Certification & Compliance** |
|---|---|
| **Duration** | 45:57 |
| **Content** | Certification & Compliance |
| | Issuer-host certification |
| | Acquirer-host certification |
| | Terminal certification |
| | Chapter 8 Quiz |
| | Course survey |

# Reviews from our alumni

Justine Naidoo, Junior EMV Specialist in Standard Bank South Africa

★★★★★

It has been an incredible opportunity having to do the ISO 8583 ONLINE TRAINING, It was user friendly and straight to the point, easy to understand and it included very relevant information needed when working with ISO. I highly recommend that this course becomes a basis for all users of ISO, purely because of the content that touches on each and every 'element '(no pun intended) of the system. I enjoyed the interactive voice over that made it easier for me to understand as I am more of a listener than a reader

Innocent Oketayot, Systems Administrator-Finance Trust Bank, Uganda

★★★★★     **Excellent Course**

The content of the course is precise, hitting the main points and provides complete information on each of the topics presented. I never once had to refer to an external information source such as Google to help me understand a concept from the course. Secondly, for such a highly complex topic such as transaction processing, the course was presented in such a simplified manner that I quickly understood all the concepts being presented.

The videos are also well narrated and in sync with the text that is displayed on the screen. The narration voice is clear, and the pace of narration is the right speed. I found it very easy to follow along; coupled with the fact that I could easily pause and reverse anytime I needed to get a topic better. The slides also have the right amount content, not too less or too crowded. The simulations also helped me to get a clear picture of the topics being presented.

I also viewed the course videos a few times using my mobile phone and the experience was equally great.

The exercises provided for download really helped me to get a stronger grip of the topics. The course material provided at the beginning also served as a reference material every time I could not go online to do the course.

Mphikeleli Zwane, Software Developer at Altech Card Solutions

⭐⭐⭐⭐⭐     **Transaction processing**

Before taking this course, i had a little knowledge about transactions flow and processing from the merchants terminal to the card issuer and the parties involved.

This course made it easy for me to understand the processing of transaction within our company. with the help of this course, now i know the different message types, ISO 8583 message layout, fields and their meaning, different ISO 8583 message protocols. Without this course it would take me a year or so to understand the general flow of transactions from the Terminal to the issuer.

I would recommend this course to anyone who works in Payment industry, it is easy to follow and understand.

Mphikeleli Zwane, Software Developer at Altech Card Solutions

⭐⭐⭐⭐⭐     **Transaction processing**

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## Modular approach

This course has also been split into 4 modules that can be purchased separately. Each module comes with its own completion certificate, which students can print or share on their LinkedIn profile.
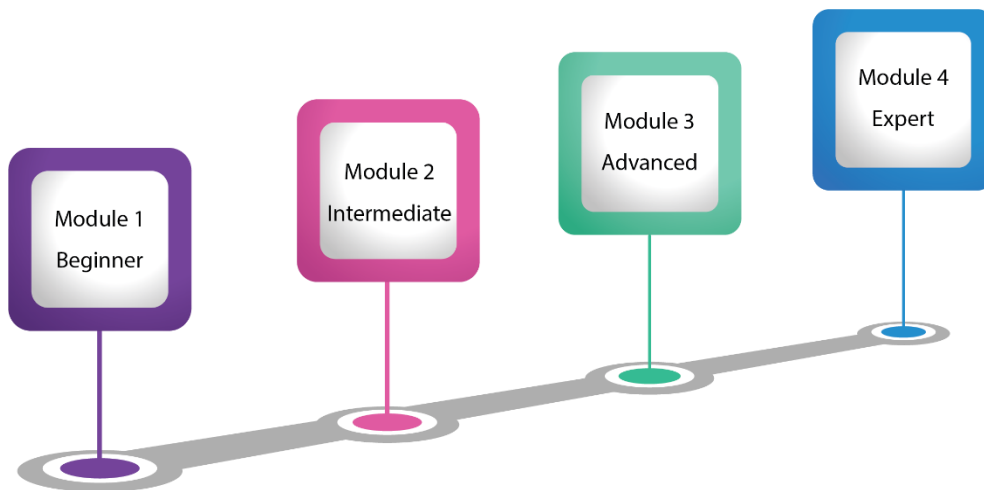


**ISO8583 Module 1: Beginner**

Course page: https://courses.paytech-academy.com/courses/ISO8583-Module-1

The ISO8583 Module 1 course starts with the big picture: the non-technical, high-level information. Then students start their journey into the technical aspects of ISO 8583 with an overview of how messages are structured, followed by a course on Message Type Identifiers and explanations on transaction flows.

The course finishes with a high-level view of how EMV and contactless transactions work, as well as how online PIN is processed.

Those constitute the building blocks needed to continue to the second module of the complete course.

**ISO8583 Module 2: Intermediate**

Course page: https://courses.paytech-academy.com/courses/ISO8583-Module-2

The ISO8583 Module 2 course starts with by some technical fundamentals; this is to ensure that students have a solid IT base for ISO 8583, and is supplemented with practical exercises.

The course then covers bitmaps and length and format indicators. Those courses are supplemented with practical exercises so that students can apply those concepts.

The journey continues with an in-depth review of all the ISO 8583 data elements, looking at the 1987 and 1993 norms and at how they are used in practice in the industry. This is also supplemented with practical exercises, to help students grasp how those data elements are structured. The capstone of this review is a course on message parsing, where students learn how to extract information from a raw ISO 8583 message, and perform parsing themselves. And the in-depth journey on ISO 8583 finishes with explanations on data element presence in messages.
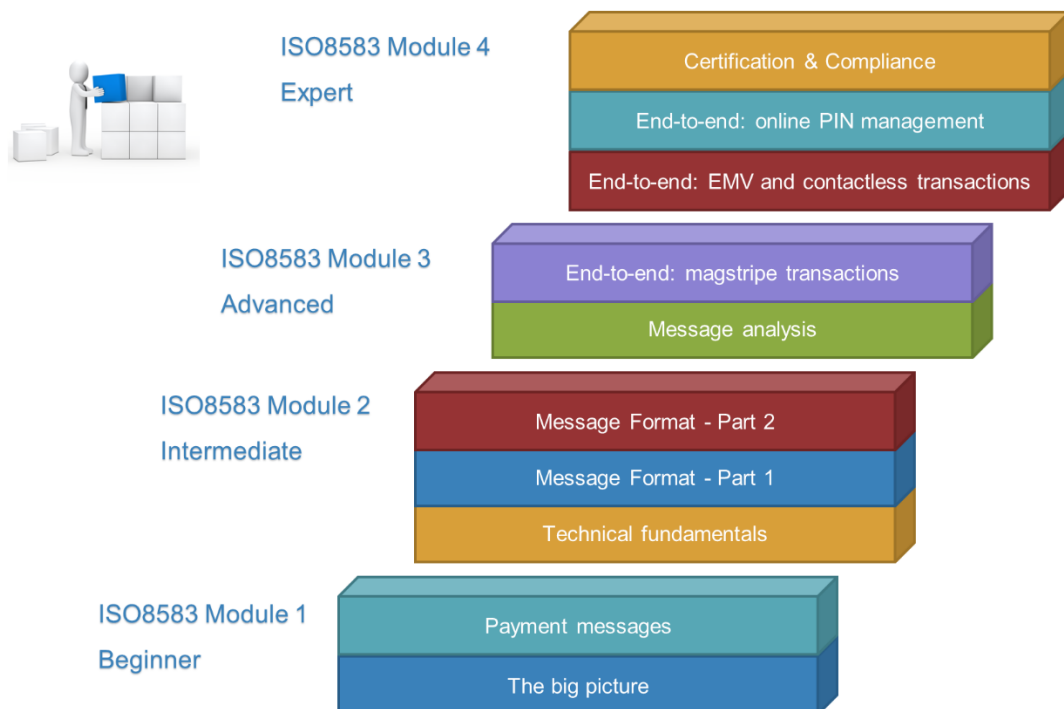
**ISO8583 Module 3: Advanced**

Course page: https://courses.paytech-academy.com/courses/ISO8583-Module-3

The ISO8583 Module 3 course zooms out of the low-level structure of ISO 8583, and teaches students how to perform analyses of individual messages, starting with network management messages, really focusing on authorization request messages, and also looking at authorization advice, financial messages, and reversals. Practical exercises with many different transaction samples are provided to help the student construct real experience on message analysis.

The course then zooms out once more, and looks at the transactions from end to end. It follows ISO 8583 messages as they are generated by a payment terminal all the way to their authorization by a card issuer, going through the different message conversion processes, where the student can see the data elements that are converted, removed and added as the message is processed by each actor of the payment chain and potentially changes version of ISO 8583. Magstripe and contactless magstripe are covered.

**ISO8583 Module 4: Expert**

Course page: https://courses.paytech-academy.com/courses/ISO8583-Module-4

The ISO8583 Module 4 course looks at contact EMV and contactless EMV transactions from end to end. It follows ISO 8583 messages as they are generated by a payment terminal all the way to their authorization by a card issuer, going through the different message conversion processes, where the student can see the data elements that are converted, removed and added as the message is processed by each actor of the payment chain and potentially changes version of ISO 8583.

The course then focuses on online PIN, where the student can see the hidden complexity that surrounds online PIN, follow a full end-to-end online PIN transaction with the different HSM calls, and learn how dynamic key exchange is handled by the different systems.

The course concludes on the difference between brand compliance and certification, how they work and what is expected by the brands.